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ABSTRACT

This two-part handbook reviews present teaching materials used by vocational agriculture teachers of Nepal, discusses opportunities for improvement of curriculum materials and teaching methods, and provides additional materials for the improvement of academic, vocational, and professional competencies for all vocational agriculture teachers of Nepal. The first part of the handbook discusses: (1) the status of vocational agriculture in Nepal with respect to schools offering programs and the characteristics of an optimum teaching environment, (2) educational and famly backgrounds of full-time vocational agriculture students, (3) conditions confronting graduates, (4) principles of teaching and learning, (5) effective teaching methods, (6) supervised farming, (7) Future Farmers of Nepal, (8) a course of study in vocational agriculture, and (9) young farmer training program. The second part of the handbook includes: (1) a discussion of lesson plan preparation, including definitions of lesson plan and objective, suggested teaching methods, and components of a lesson plan, (2) a discussion of teaching methods, including lecture, group discussion, supervised study and discussion demonstrations, field trips, and others, and (3) several sample lesson plans. (SB)

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Nepal Vocational Agriculture Teacher's Handbook

Harvey S. Woods
and
Thomas R. Stitt

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NEPAL VOCATIONAL AGRICULTURE TEACHERS' HANDBOOK

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NEPAL

Vocational Agriculture
Teacher's Handbook

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and
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INTRODUCTION

NEPAL is a country of beautiful scenery, but when compared to many other countries of the world, too many of its people are economically poor. The economy is based almost entirely upon agriculture. Present estimates indicate that 90 percent of its population work directly in agriculture. If the transporters, merchants, professional people, and others wjo work for agriculture, were included, the total probably would be as high as 95 percent.

The people of Nepal, like those of all other countries, desire an improved standard of living. Since the natural resources of Nepal are predominantly agricultural, a higher standard of living can be attained only through the improvement of agricultural technology. Presently, too many of the Nepalese people must devote their labor to food production. As a result, there is little or no labor left to produce, or to work elsewhere to earn the money to buy, those items required for the so-called "higher standard of living."

In an attempt to remedy this situation, many agriculture problems have been attacked during the past decade. One of the major efforts has been toward improving the education of the young Nepalese people in agriculture. Progress has been made, but at the present time, much remains to be done.

Two primary objectives of this handbook are:

1. A review of present teaching materials by selected in-service vocational agriculture teachers of Nepal and to determine opportunities for improvement of curriculums and teaching methods in vocational agriculture.

2. Development of additional materials that will provide opportunities for improvement of academic, vocational, and professional competencies for all vocational agriculture teachers in Nepal.

In attempting to achieve these objectives, it was assumed that a review of the present agricultural situation in Nepal was necessary to partially acquaint those people, unfamiliar with Nepalese agriculture, with the actual situation—especially the present and future agricultural consultants or advisers from other countries. As a result, considerable space has been devoted to Nepalese agriculture and vocational agriculture as it is today. Since needed empirical data were not available, they were drawn from the experiences and knowledge of five in-service vocational agriculture teachers. With this information, it is hoped that a more realistic vocational agriculture program can be developed to meet the apparent needs.

To offer further help to the Nepalese vocational agriculture teacher in developing this realistic program, a review has been presented of the principles of learning, the steps in the teaching process, procedures and techniques in developing lesson plans, sample lesson plans, formation of desirable agricultural organizations, and supervised farming.

By becoming fully aware of the present situation, and by adopting efficient and profitable agricultural technology through a fully developed vocational agriculture educational system, the agriculture of Nepal can be improved, and the standard of living of all Nepalese people will be raised.

ACKNOWLEDGMENTS

THE INFORMATION and materials assembled in this handbook are a primary result of the continuous and cooperative work of five experienced vocational agriculture teachers of Nepal:

Madan Prasad Adhikari
Tri-Juddha M. P. H. S.
Birgunj, Narayani Zone

Ram Nath Bastola
Public M. P. H. S.
Dharan, Kosi Zone

Ram Chandar Jha
Public Bindeshwari M. P. H. S.
Rajbiraj, Sagarmatha Zone

Shri Hari Sharma
Mangal Prasad M. P. H. S.
Nepalgunj, Bheri Zone

Tanka Prasad Sharma
Padmodaya Public M. P. H. S.
Bharatpur, Dang Rapti Zone

These five men made great personal sacrifices in time, absences from homes and families, and in pure, hard work. Without their efforts, their knowledge of vocational agriculture, and their practical experiences in the agriculture of Nepal, this Handbook would not have been possible.

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NEPAL VOCATIONAL AGRICULTURE

TEACHER'S HANDBOOK

PART I

Chapter I

VOCATIONAL AGRICULTURE IN NEPAL, 1970

Schools Offering Vocational Agriculture

TWENTY-ONE multipurpose high schools in Nepal offered vocational agriculture to Grade 6, 7, 8, 9, and 10 in 1970. The name of each school, its location, approximate air-line distance from Kathmandu, and general direction from Kathmandu are shown in Table 1. Student enrollment and the number of vocational agriculture teachers in each school also are given.

It is recognized that most of the 21 schools presently offering vocational agriculture are deficient in some areas of their total teaching environment. Progress is being made, however, and there are continuing efforts for further improvement. A good vocational agriculture teacher, as a good teacher of any subject, must constantly strive to do the best possible teaching with available facilities, equipment, and materials. At the same time, a good teacher must have goals for improvement that will eventually provide an optimum teaching environment.

Classrooms: Adequate and desirable classrooms have been described in a publication in English written by S. M. Joshi and Charles A. Cazaly, "Vegetable and Fruit Production," for Grade 6, as well as Nepalese texts for Grades 9 and 10. This publication emphasizes that all classrooms, to provide near-optimum teaching and learning environments, should have at least the following characteristics:

1. Adequate size.
2. Good chairs, tables, and related school furniture.
3. Good lighting.
4. Blackboards, charts, maps, photographs, and other appropriate teaching aids.

TABLE 1

Multipurpose High Schools in Nepal Offering Vocational Agriculture in 1969-70

School	Location	From Kathmandu Air Miles	From Kathmandu Direction	Vo-Ag Enrolment	Vo-Ag Teachers
Adarsha	Biratnagar	147	ESE	72	2
Adarsha (Demonstration)	Sano Thimi	4	E	52	2
Bhadrapur	Jhapa	188	E	93	2
Bidyodaya	Bhojpur	112	E	47	2
Bidya Mandir	Baglung	118	W	58	3
Bindeswori	Rajbiraj	125	ESE	70	3
Birendra	Baitadi	330	W		3
Chandan Nath	Jumla	227	WNW	19	2
Jiri	Jiri	54	ENE	30	1
Karfok	Karfok	175	ENE		2
Mangal Prasad	Nepalgunj	237	WSW	66	2
*Mohan Uchangle	Siraha	90	SE		
National	Pokhara	93	W		1
Padma	Doti	292	W		2
Padmodaya	Dang	193	WSW	121	3
Padma Palpa	Tansen	115	WSW	76	3
Public	Dharan	132	E	74	2
*Sanjibani	Dhulikhel	12	ESE		
Sarada	Chitwan	55	SW		
Saraswoti	Janakpur	78	SE	108	
*Satyebedi	Bajhang	283	WNW		2
Shree Matri Bhumi	Shangha	78	W	73	
Shree Padma	Bhaktapur	8	E	59	2
Shree Ram Gorkha	Bahadurgunj	157	SW	120	2
Tri-Juddha	Birgunj	57	S	90	2

* Converted to multipurpose but not yet approved.

Fig. 1—A sixth-grade class and teacher of the Demonstration Multipurpose High School at Sano Thimi.

5. Freedom from noise and distractions.
6. Good ventilation.
7. Good construction and appearance.
8. Storage for teaching materials.
9. Comfort for teacher and students.

Laboratories: The basic principle of all vocational education is "Learning by Doing." Actual work in the desired skill is most essential. Without principles of application and applied practice, no student can develop a vocational skill. In vocational agriculture, as in all vocational subject areas, the primary concern must be directed toward skill development, based upon previously proven principles. These principles must be made adaptable to the student, and eventually, the farmer. Therefore, each school offering vocational agriculture should have an agricultural laboratory. It should provide adequate equipment and supplies to enable both teacher and students to work together for optimum teaching and "Learning by doing."

A vocational agriculture laboratory should have the same desirable characteristics as those listed previously under classrooms. In addition, it should provide:

1. Collections of local materials.*
   a. Seeds.
   b. Crops.
   c. Weeds.
   d. Insects.
   e. Soil samples.
   f. Others—items almost unlimited if the teacher uses imagination and innovations.

2. Equipment and supplies for experimental work by each student.
   a. To demonstrate and prove present principles to students.
   b. To allow teacher and students to develop new principles.

3. Opportunities for demonstrations in all phases of agriculture.

A school farm that does not provide the above, or at least the potential for attaining the above in the near future, is most likely not worthy of being considered a school farm.

School Farms: Again, the basic principle of vocational education is "Learning by Doing." Since this principle is so widely accepted as valid, every school offering vocational agriculture should have a school farm, herein considered an "outside laboratory", that:

1. Is close to the school.
2. Provides sufficient land.
3. Provides adequate equipment, supplies, management, and operational labor.
4. Provides opportunities for soil testing and appropriate fertilizer applications.
5. Provides the necessary irrigation equipment and water.
6. Allows students to make decisions and try out their own projects.

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* A detailed list of tools and equipment is given in Part II.

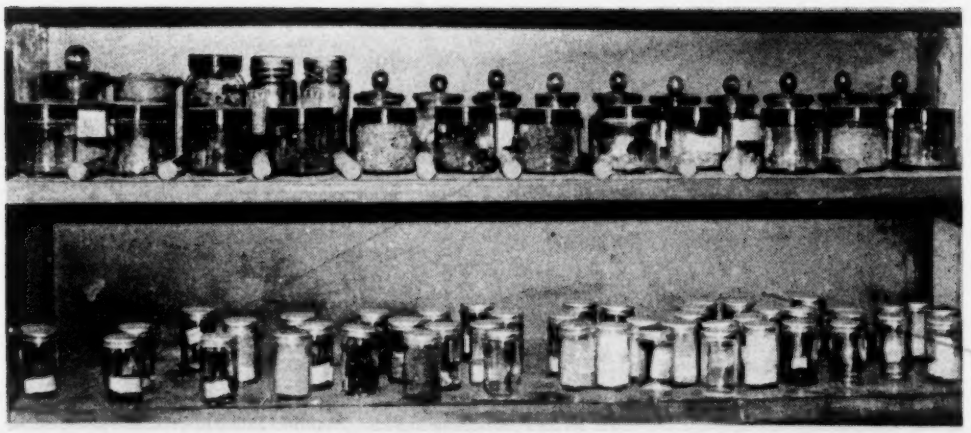


Fig. 2—Samples of seeds collected locally and placed in covered glass jars make a useful and attractive classroom display easily available to students and teachers.

7. Allows students to develop and demonstrate necessary operational skills
8. Provides a workshop for maintenance and storage for equipment and tools.
9. Is adequately fenced.

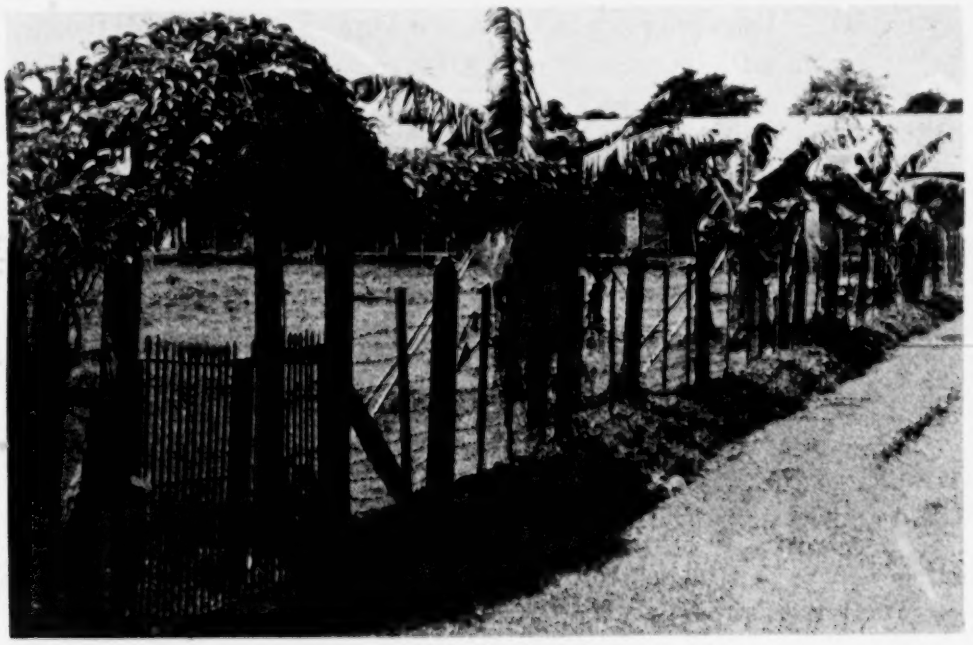
Vocational Agriculture Teachers: The minimum qualifications of any teacher in Nepal are prescribed by the Ministry of Education. A good vocational agriculture teacher will always be aware of the following minimum characteristics:

1. Professional Preparation.
   a. Intermediate Science Degree plus additional study and continuous self-improvement.
   b. A practical and working knowledge of the most efficient agriculture for his district.

Fig. 3—Soil samples can be exhibited in covered glass jars. Such teaching aids can contribute much value to class discussions.

Fig. 4—Good fencing and properly constructed gates help assure the safety of crops, livestock, and equipment on the farm.

Fig. 5—The Bhadrapur MPHS in Jhapa District uses barbed wire for fencing its farm. The gate is made of iron, and is strong and durable.



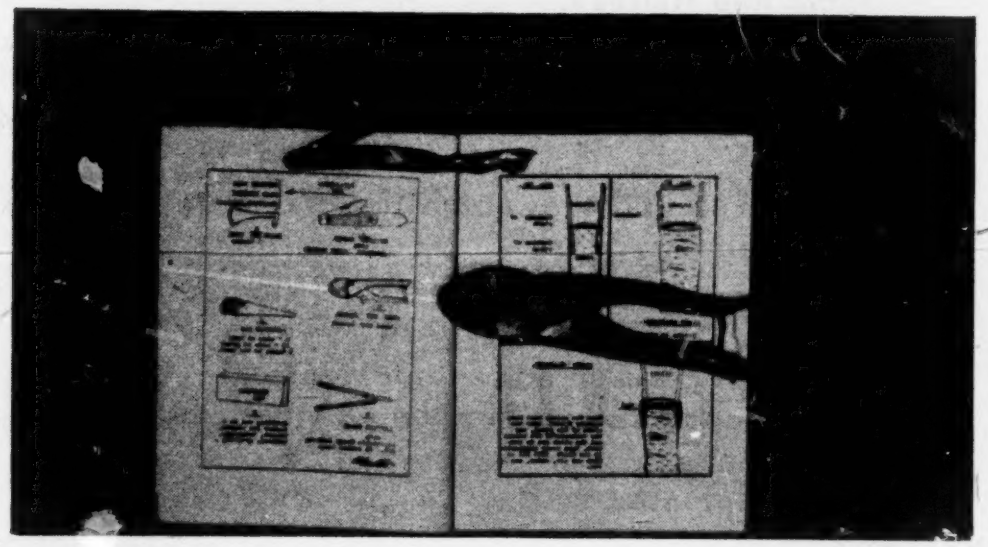
2. Personal.

   a. High moral character.
   b. Good personality.
   c. Ability to get along well with all associates.
   d. Courtesy to all.
   e. Desire to learn continually.
   f. Desire to teach and dedication to teaching vocational Agriculture.
   g. Good appearance.
   h. Punctuality.

Textbooks: A desirable textbook should be collection of valid data assembled in a manner suitable for presentation to students by the teacher and for later study by the students.

The acquisition of good textbooks presents a problem for all schools of the world. In Nepal, the problem is greater, primarily because of the cost of good texts relative to per capita income. Agricultural texts present a further problem. Publishers are aware that texts that will be used by all students are more profitable than specialized books. As a result of the limited market, publishers are reluctant to offer agricultural books.

Fig. 6—Tools and textbooks are complementary. The effective vocational agriculture teacher combines both in his teaching.



In adopting a textbook, the one finally selected should provide the following minimum desirable characteristics:

1. Subject matter presented in a manner suitable for the students who will be using it.
2. Correlated with the curriculum.
3. Printed on good paper in clear, easy-to-read type.
4. Language easy to read and understand.
5. Visual aids such as photographs, diagrams, adequate and well-presented.
6. Contents properly arranged.
7. Stimulating vocational interest and a desire to excel.
8. Providing suggestions for practical exercises or laboratory work.
9. Presenting a summary at the conclusion of each major topic of study.
10. Providing study questions and or exercises at the end of each major unit of study.

In many, and probably most situations, it is educationally unsound to present procedures that are not to be followed. However, it has been assumed that many unsuitable texts are still on the market. As a result, some undesirable characteristics of some texts will be listed. Textbooks should <u>not</u> be selected if they have the following characteristics:

1. Disregard educational processes and present mere facts and figures.
2. Disregard the aims and objectives of teaching principles.
3. Limit the methods of instruction and means of evaluation.
4. Written so that they actually cause a decrease in skill development.
5. Written so that they destroy student initiative and spirit.
6. Stress recitation and memorization.
7. Do not correlate with adopted curriculums.
8. Poorly organized.
9. Poorly printed.

10. Difficult to read because of grammatical errors.
11. Translated incorrectly.
12. Lacking in adequate photographs, diagrams, tables, graphs, charts, etc.
13. Omit relevant topics of study.
14. Out of date.

The Multipurpose Division of the Ministry of Education recommends specific texts for use in the Vocational Agriculture Department. The Vocational Agriculture Teacher must assume the responsibility of securing the list of texts from the Ministry and keeping the Headmaster informed of specific needs. Adequate numbers of books should be secured to meet the needs of the class.

Reference or Resource Materials: A good vocational agriculture teacher, like all good teachers in other discipline, will continuously develop pertinent reference or resource materials. As the teacher gains experience and accumulates more desirable materials, he will become a better teacher. With the acquisition of textbooks being such a problem, optimum development of such materials may be the only practical solution. All teachers should realize that some of the best textbooks have been written by experienced teachers who have assembled and published their reference or resource materials in a manner suitable for presentation to students by any good teacher, and for study by interested students.

In developing reference or resource materials, the vocational agriculture teacher should include the following:

1. Books pertaining to all areas of agriculture.
2. Bulletins, circulars, and pamphlets.
3. Visual aids.
   a. Graphs.
   b. Charts.
   c. Maps.
   d. Printed photographs.
   e. Slide photographs.
   f. Motion picture titles and evaluation.
4. Newspaper and magazing articles.

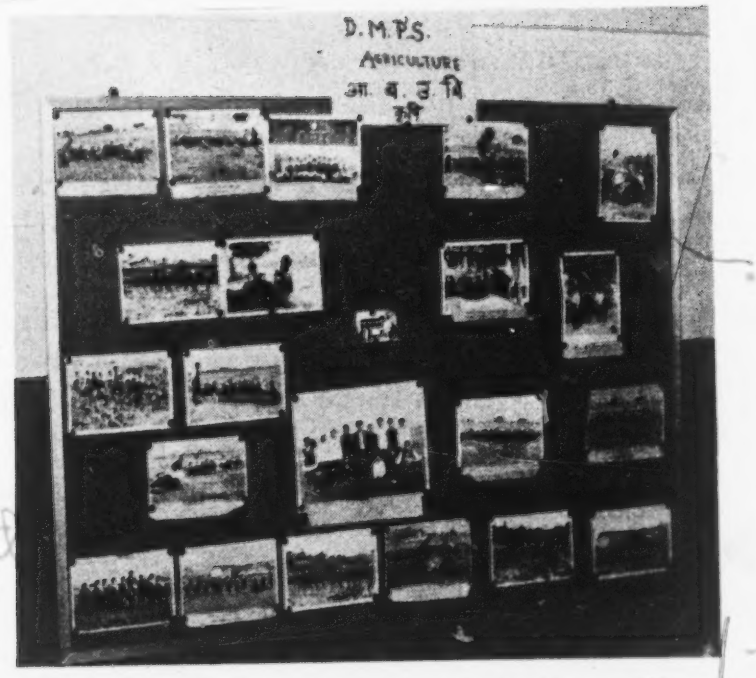


Fig. 7—Photographs can add lively interest to displays. They are useful also as visual aids and to show the breadth of the school's activities.

5. Models.
6. Desirable information assembled by the teacher from previous work in the classroom, farm shop, school farm, and elsewhere.
7. Successful lesson plans used previously.

Equipment and Supplies:* In reality, textbooks, reference materials, and other items previously discussed are equipment and supplies. Few schools in the world have everything that could be used profitably. However, the vocational agriculture teacher should be constantly aware of what is needed, and he should list all items needed in order of priority. He should make certain his headmaster or principal is aware of these needs.

Maximum efforts should be made to acquire some high-priority items of equipment and supplies in the following areas:

* A detailed list of tools and equipment is given in Part II.

1. Items needed daily.
   a. Pencils
   b. Paper.
   c. Small instruments used by teacher and student.
2. Farm shop.
   a. Necessary tools for all skill areas.
   b. Adequate electrical power.
   c. Adequate fuel and oil.
   d. Adequate wood, metal, nails, screws, and the like.
3. Animal science tools and supplies.
4. Poultry science tools and supplies.
5. Soil science instruments, testing equipment, surveying instruments, etc.
6. Crop science tools, specimens, etc.
7. Pertinent scientific instruments needed by the teacher for the development of resource materials and demonstrations.

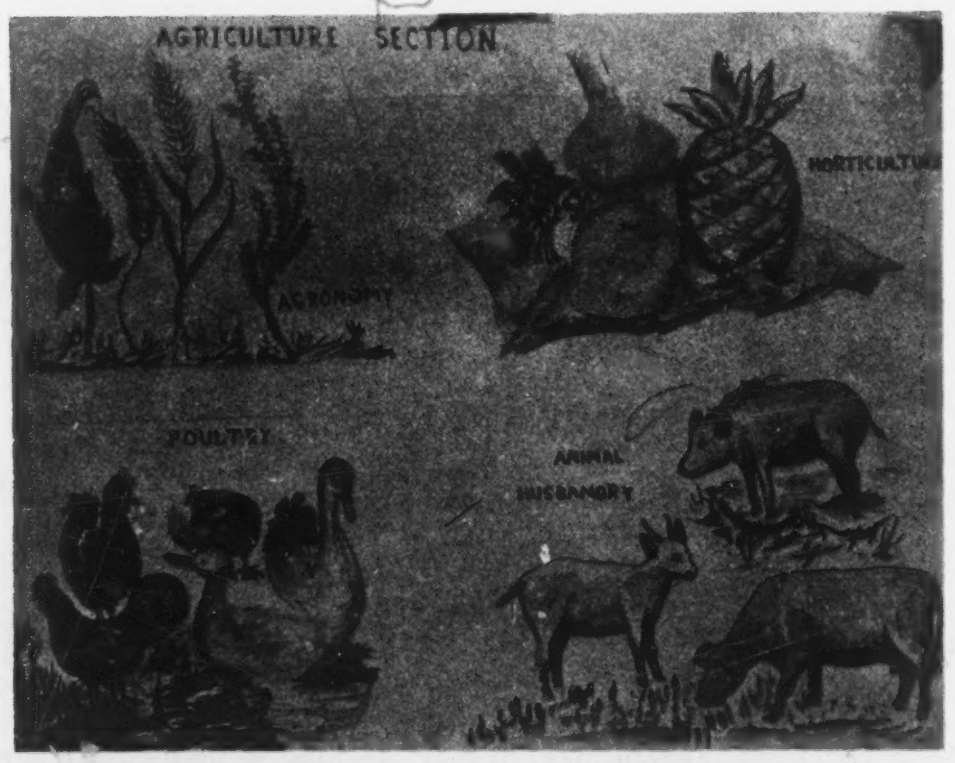


Fig. 8—Although inexpensive, teacher-made posters serve a valuable purpose in helping students to learn.

Fig. 9—Livestock raised on the school farm is a valuable aid to teaching.

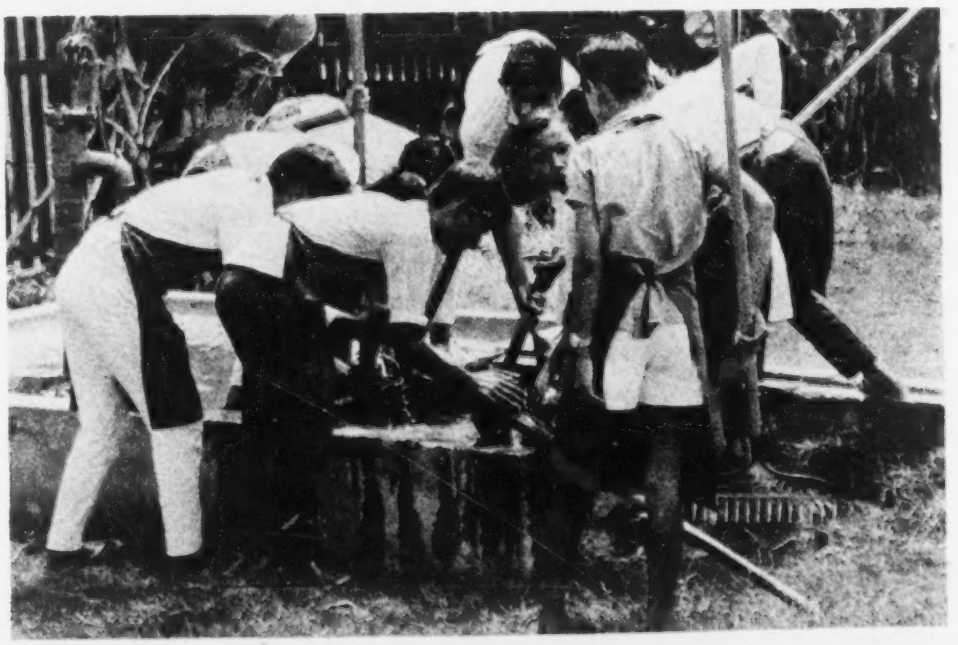


Fig. 10—In vocational agriculture, proper cleaning of tools after each use is essential if tools are to be maintained in good condition and have a long and useful life.

Fig. 11—The good instructor inspects the school's tools daily before they are returned to storage. Improperly cleaned tools are recleaned, then returned to the tool-room.

Agricultural Mechanics (Farm Shop):* The study of the history of the development of any country indicates the importance of agriculture to that development. Such a study also indicates that progress in agricultural technology of any country has been directly dependent upon the mechanization of its agriculture.

Training in agricultural mechanics can best be started in the Nepalese school system as an integral part of the vocational agriculture curriculum. Here, the students must be made aware of the possibilities for mechanization on Nepaleses farms, and they must be made to develop confidence that they can operate and repair farm equipment.

Agricultural mechanics instruction includes those non-specialized mechanical activities performed on the farm and in farm related businesses. In a fully developed program, these activities usually are taught in five broad areas:

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*A detailed list of tools and equipment is given in Part II.

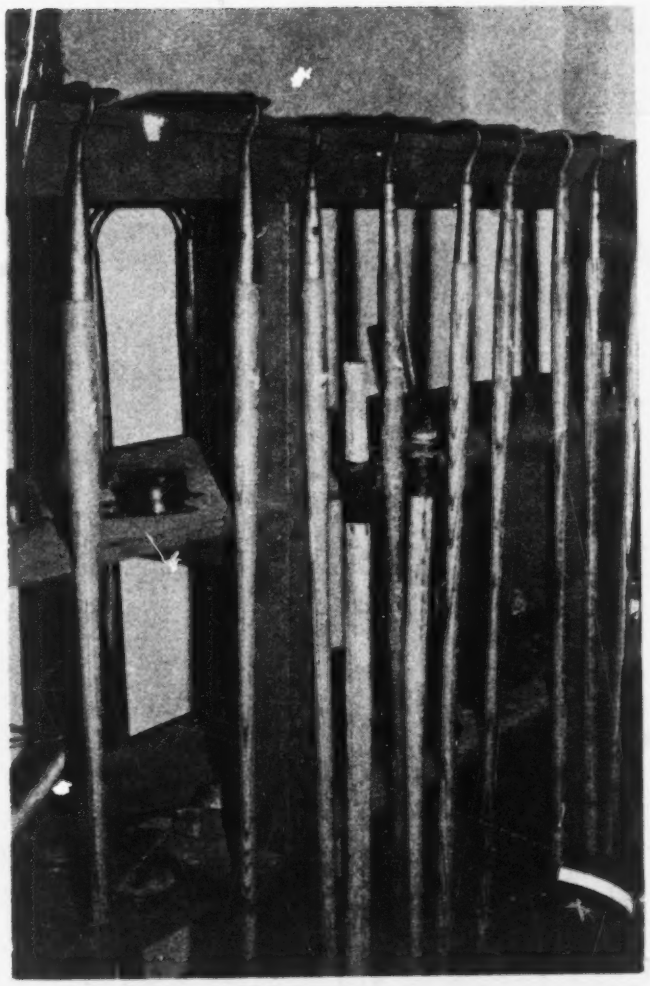

Fig. 12—The right tool for the job is required if a successful field program in vocational agriculture is expected. Good storage facilities ensure proper care and efficient inventory control.

1. Agricultural shop work.
2. Agricultural power and machinery.
3. Farm buildings and equipment.
4. Soil and water management.
5. Farm electrification.

Almost every task in agriculture involves some mechanical activity. In Nepal, there is an ever-increasing need to develop mechanical knowledge and skills. Even with increased mechanization, a person employed in agriculture cannot become successful unless he possesses mechanical knowledge and skills. Teachers of vocational agriculture must use every opportunity to include in their program of instruction those areas, jobs, and skills, necessary to train the students for success in agriculture.

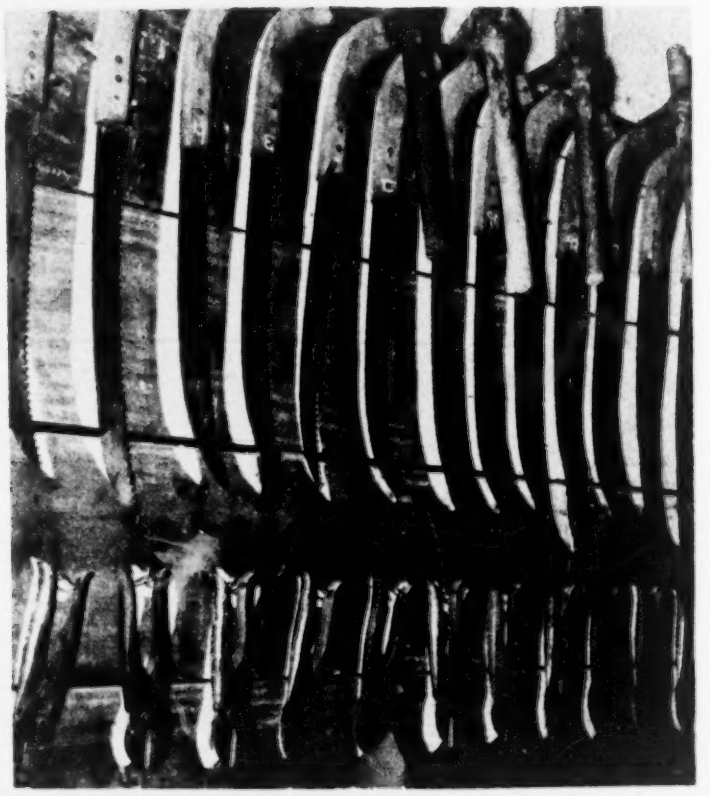

Fig. 13— Tool racks designed for specific items make efficient storage easier for both students and teachers.

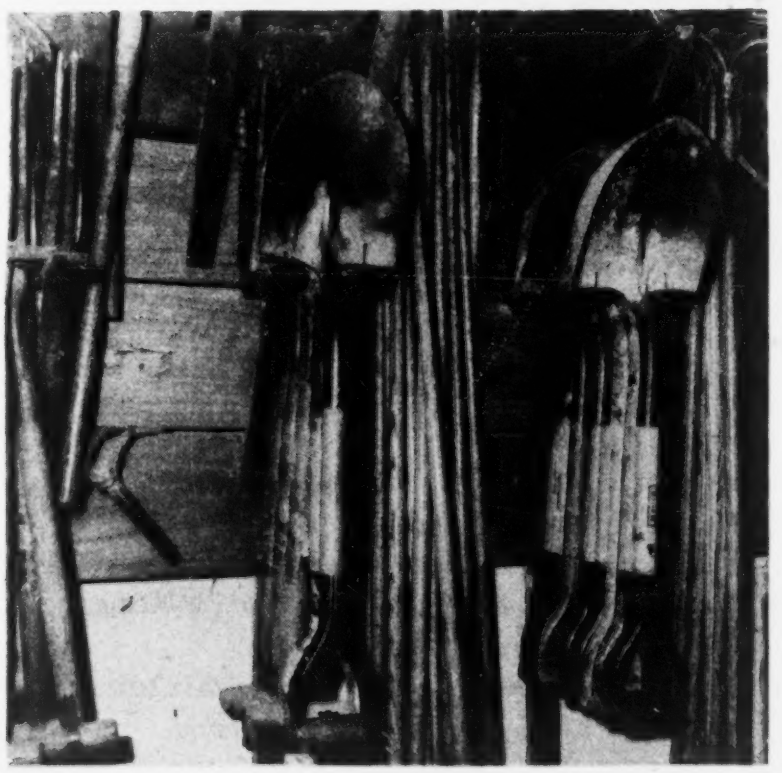

Fig. 14—Partially-completed wooden floats that students can finish. This tool is required for making a good surface finish on concrete work.

In instruction pertaining to agricultural mechanics, the following objectives should be attained:

1. To develop and maintain an agricultural mechanics laboratory (farm shop) that provides facilities and equipment for a full agricultural mechanics program of instruction.

   Such a facility cannot provide the services necessary for an agricultural mechanics program if it is used as the "storage room" for other subject areas, maintenance, men and janitors.

2. To develop and maintain a functional relationship among the soil, the crops, the farmstead, the farm equipment, and the available land for any given farm.

3. To provide instruction in those skills, abilities, attitudes, and data necessary to meet the needs of the vocational agriculture students, the young farmers, and the adult farmers for any given farm in Nepal.

4. To initiate the establishment and proper maintenance for a functional farm shop on the home-farm.

Vocational Agriculture Teacher Welfare: Regardless of their occupations, workers throughout the world have one common goal: To improve their standard of living. Workers in some countries have a higher standard of living than workers in others, and they have this higher standard of living for only one reason: They are producing more with their efforts.

No country can have even as much as a so-called "average standard of living" unless its people produce. The more productive the workers of a given nation are, the higher is the standard of living of that nation.

Vocational agriculture teachers, as well as other teachers, are workers. There product is not so immediately visible as that of certain other types of workers; but their work, teaching to help others to learn, is the backbone of the economy of any country. No nation can expect to compete in the economy of the world today without providing education to its people, and teachers are necessary to provide that education.

Nepalese school teachers have made much progress in just two generations. Not too many years ago, a teacher in Nepal received as little as two and one-half rupees per month for a few months each year. Today, Nepalese teachers are preparing themselves to be better teachers, and they are thereby producing more—offering a better education to the young people of Nepal—and they receive greater economic returns than the teachers of twenty to forty years ago.

Regardless, the Nepalese teachers of today should hope for even greater production and greater economic returns, for themselves, as well as for all the people of Nepal. Opportunities for professional and economic improvement to themselves, and economic returns to the other people of Nepal, include ever-improving conditions in the following areas:

1. Quality of training offered at all higher institutions of learning.
2. Opportunity for the vocational agriculture teachers to visit other vocational agriculture programs of Nepal.

3. International teacher communication and seminars.
4. Salaries.
5. Status.
6. Provident funds.
7. Pensions.
8. Insurance.
9. Payment for extra work.
10. Job security.
11. Revolving funds.
12. Education.
13. Medical aid.
14. Housing and land.

Course of Study in Vocational Agriculture for School Leaving Certificate (SLC): In a later chapter, "Effective Teaching Methods," the course outline is discussed. The course of study for the SLC is a course outline provided to the vocational agriculture teachers of Nepal by H.M.G., Ministry of Education, Department of Education, Secondary Multipurpose Education Division.

The teacher should not fail to realize that this is a course outline, and as such, it should be the backbone and framework of the curriculum for which it is intended. It has been stated that it is too rigid and inflexible. Actually, it is only as rigid and inflexible as the given teacher wants to make it. The topic headings really are very general. As a result, the innovative and imaginative teacher has great opportunity to develop subheadings to cover each topic heading according to his own desires, ability, and community needs.

Lesson planning is discussed in the same chapter. A good teacher will realize the importance and benefits of a good lesson plan. However, before a good lesson plan can be developed, there must be a course outline. The course of study for the SLC is at least the beginning of a good course outline. If more subheadings are desired, it is really the individual teacher's responsibility to add them. In all probability, the good teacher will do so in the preparation of daily lesson plans.

Course outlines and lesson plans must be used for optimum teaching success. The course of study for the SLC is a course

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outline. As such, it does not include the amount of instruction necessary, teaching procedures, or standards for completion. These latter criteria are the purpose of the lesson plan.

Although suggested activities are included in the SLC course of study, it is possible that the need for practical work, the "Learning by Doing" of vocational agriculture, is not emphasized adequately.

Before the SLC course of study can be used for really effective teaching, the individual teacher must prepare daily lesson plans that are adequate to cover each of the topic headings, plus any subheadings that he himself may add. The same is true for any good course outline.

Fig. 15—The living, growing plant on the school farm provides a laboratory for horticulture discussions. Studies of soil take on new dimensions when classes are held in the fields of the school farm.

Chapter II

FULL-TIME VOCATIONAL AGRICULTURE STUDENTS IN NEPAL

Educational Background

Nepalese students may begin taking vocational agriculture when they enroll in Grade Six. During Grades One through Five (Primary School), the students have studied and passed the annual examination conducted by the schools or district boards in at least the following subjects:

1. English.
2. Nepali.
3. Mathematics.
4. Science.
5. Social Studies.

Educational law in Nepal provides free and compulsory education for Grades One through Five. A very small percentage of Nepalese young people go to school after Grade Five. Tuition begins at Grade Six at approximately six rupees per month. This amount increases steadily as the upper grades are attended.

Steps for Education After Grade Five

To progress from Grade Five to any higher level up to the Ph.D., the following steps are necessary:

1. Pass the annual examination conducted by the school or district board for Grade Six before going into Grade Seven.
2. The same is necessary for Grades Seven, Eight, and Nine.
3. The SLC must be passed in order to complete Grade Ten. This is conducted by H.M.G. Education Department, SLC Board.

4. Enter college.
   a. Some science colleges require entrance exams.
   b. Some other colleges admit any student who has passed the SLC without requiring an entrance exam.
5. After two years of college, in order to proceed further, all students must pass the Intermediate Exam (after eleventh and twelfth years) conducted by the University.
6. After passing the Intermediate Exam, the student may proceed into one of the bachelor degree programs (thirteenth and fourteenth years).
7. After passing the B.A., B.Sc., or B.Com. Exam conducted by the University, the student may proceed to the M. A. or M. Sc. program.
8. After passing the two-year master's degree exam conducted by the University, the student may enter a Ph.D. program. This program involves course work, research, and a thesis under the supervision of a professor. Two to five years are usually required to complete this program.

Present Academic and Skill Development Levels.

Nepalese students may begin taking vocational agriculture courses after completing Grade Five. Such students are young and usually lack vocational skills. Most of their previous education has been purely academic — English, Nepali, Mathematics, Science, and Social Studies, Some students have worked on the farm with their fathers, but few farms provide adequate opportunities for the development of more than a few elementary skills. Some students have no farm background, and as a result, they have few, if any, skills.

In general, vocational agriculture teachers of Nepal may make the following assumptions relative to their beginning students:

1. The academic background of the beginning vocational agriculture student is adequate.
2. The beginning student in vocational agriculture has few, if any, vocational skills, even in agriculture.

Such a situation should not be considered a handicap. Since beginning students are so young when they enter vocational agriculture training in Grade Six, there is ample time for skills development as a result of explanation and demonstration of each skill by a good vocational agriculture teacher, plus trial and practice under the supervision of the teacher.

For Grades Six through Ten, some Nepalese vocational agriculture teachers feel that too little time is allowed for vocational agriculture in the total curriculum for optimum skills development levels. In order to graduate from Grade Ten, all students must pass the SLC examination. Non-vocational students may have more time to prepare for this exam because they are not taking vocational courses. To become proficient in vocational skills, and at the same time, become adequately prepared for the SLC exam, some teachers believe more work is actually required of the vocational student than of the non-vocational student.

Type of Home Farm

It has been assumed that the majority of vocational agriculture students in Nepal are from farms. In some schools, all vocational agriculture students come from farms. In others, students without farm experience or any land in the family may also take vocational agriculture. Regardless, the typical vocational agriculture student comes from a farm of rather standard characteristics.

Size: The usual size of the home farm where the family lives consists of three kaltha, two ropanis, one seventh bigha, or 11,000 square feet. In addition, a maximum of 25 bighas may be owned on the basis of Nepal law. However, most farmers own or farm three to four bighas. On rented land, the usual division of the crops is 50 percent to the landlord and 50 percent to the tenant. The landlord may take a smaller share on the less fertile and less productive soils.

Site: Most Terai vocational agriculture students come from farms with the following characteristics:

1. Level land, but some with terraces.
2. Irrigated, but some cannot be irrigated as water is not available.

3. Usually sandy clay loam.
4. More plant food is needed for optimum fertility and crop yields.
5. Soil pH from 4 to 7.
6. In many areas of Nepal, there are no obstacles to cultivation. In other areas, large numbers of rocks and boulders lie just beneath the surface of the soil.
7. There is adequate movement of air and water into and within the soil.

Crops: Typical crops include:

1. Paddy (rice).
2. Corn (maize).
3. Wheat.
4. Mustard.
5. Fruit.
6. Potato.
7. Tomato.
8. Radish.
9. Onion.
10. Okra.
11. Eggplant.
12. Red pepper.
13. Spinach.
14. Carrot.
15. Bean.

Paddy, corn, and wheat usually are grown on the larger areas, away from the dwelling. Fruits and vegetables are grown near the dwelling.

Livestock: Typical livestock includes:

1. Cows for milk, power, and manure.
2. Water buffalo for milk, power, and manure.
3. Goats for milk and meat.
4. Sheep for wool and meat.
5. Pigs for meat.
6. Poultry for eggs and meat.

Cottage Industries: Most Nepalese farmers, or members of their families, devote part of their labor to various cottage industries for home use.

1. Woodworking.
2. Mat-making.
3. Making clay pots.
4. Making rope from jute.
5. Weaving cloth.

Opportunities for the Vocational Agriculture Student for Experiences on the Home-Farm in Nepal

Most vocational agriculture teachers of Nepal find the home-farm situation of their students primarily as follows:

1. Parents of the students are cooperative.
2. Some students are allowed to have their own plots for their own projects, but others must work with the rest of the family.
3. No written farm account records are kept.
4. Evaluation of the home project is by comparison to similiar enterprises on the remainder of the farm.
5. Students have worked with, and learned some skills from their fathers.
6. Some schools have vocational agriculture students who do not have a home-farm.

Financial Information Relative to the Home Farm

Many people have stated that the agricultural economy of Nepal can be improved by the application of modern technology. This is most likely true; but questions immediately arise relative to how much technology is needed and how fast the Nepalese farmers should adopt it. Before attempting to answer such questions, it was assumed that a review of the resources available to the Nepalese farmer was necessary. Actual empirical data were unavailable. Therefore, a hypothetical Nepalese farm business was developed that represented the average sized home-farm of the typical young man taking vocational agriculture in Nepal.

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Combined Personal and Farm Business Inventory: The combined personal and farm business inventory for this typical farm is shown in Table 2. The items making up this total inventory are those assumed to be found on the home-farm of the typical Nepalese vocational agriculture student. As a result of showing all crops produced for the year as inventory items, this inventory represents the greatest value at any time during the year. Personal and business inventory items were combined as a result of:

1. The close relationship between the Nepalese home-farm and the farm business.
2. No business can be expanded through modern technology without consideration of the total capital resources available.

Combined Personal and Farm Business Net Worth: Using the inventory shown in Table 2, the net worth statement of the home-farm business of a typical Nepalese vocational agriculture student was calculated (Table 3). The net worth statement shown is for the family that owns its own farm. The total personal and farm business net worth is Rs. 15,528. However, many home-farms are not owned, and the personal and farm business net worth is thereby reduced to Rs. 5,871 (see Table 3).

Assuming that the data given in Tables 2 and 3 are typical, at least two conclusions may be drawn:

1. Total resources presently available will not allow expansion into technology that requires large amounts of capital.

2. At the present time, attempts at improving technology should be made in the areas of improved crop yields, production of livestock products.

Annual Farm Business Account: A summary of the farm business account of the typical home-farm of a Nepalese vocational agriculture student is shown in Table 4. As a result of the details shown, it is really more than a summary. It was assumed that, because so little cash was involved, in both expenditures and receipts, the table would be more meaningful.

TABLE 2

Combined Farm Business and Personal Inventory of the Average-Size Farmer-Owned Home-Farm of a Typical Vocational Agriculture Student in Nepal

Item	Total Value (Rupees)
4 bighas land @ Rs. 1500	6000
2 plows @ Rs. 40	80
2 spades @ Rs 10	20
2 sickles @ Rs. 2	4
2 bulls (oxen) @ Rs. 300	600
small tools (hammer, saw, etc.)	50
miscellaneous items (cart, etc.)	250
1 house (often combined with barn)	1000
1 barn	500
2 bighas paddy (rice) @ Rs. 1000	2000
1 bigha corn (maize)	350
1 bigha vegetable	500
2 bighaswheat(off-season crop on paddy ground) @ Rs. 500	1000
1 bigha mustard (off-season crop on corn ground)	1000
2 cows @ Rs. 100	200
1 buffalo	400
2 goats @ Rs. 40	80
1 pig	50
5 chickens for meat @ Rs. 5	25
5 chickens for eggs @ Rs. 5	25
1 water pot (gagro)	95
4 water pots (clay) @ Rs. 3	12
1 water pot (drinking)	20
5 plates @ Rs. 15	75
5 glasses @ Rs. 10	50
5 bowls @ Rs. 5	25
3 cooking pots @ Rs. 15	45
5 floor mats @ Rs. 2	10
5 beds @ Rs. 10	50
5 sets bedding material @ Rs. 75	375
2 stools @ Rs. 10	20
2 cots @ Rs. 25	50
5 outfits clothing @ Rs. 30	150
jewelry	500
gun, knife, spear, etc.	120
ceremonial equipment	50
savings	1000
accounts payable	1000
taxes due	168

TABLE 3

Combined Farm Business and Personal Net Worth of the Average-Size Farmer-Owned Home-Farm of a Typical Vocational Agriculture Student in Nepal

Assets	Value in Rupees		Liabilities	Value in Rupees	
Current Assets:			**Current Liabilities:**		
Crops	Rs. 4,850*		Taxes due	Rs. 168*	
Livestock	190		Accounts payable	1,000	
Total:		Rs. 5,040	Total:		Rs. 1,168
Fixed Assets:			**Fixed Liabilities:**	0	
Land	6,000*		Total:		0
Buildings	1,500		**Total Liabilities:**		Rs. 1,168
Machinery	1,004				
Kitchen utensils	600	322			
Home furnishings	505				
Livestock	600				
Clothing	150				
Personal	670				
Savings	1,000				
Total:		Rs.11,756			
Total Assets:		16,796	**Net Worth:**		Rs.15,628*
			Total Liabilities & Net Worth:		Rs.16,796

* If the land is rented the farmer receives only one-half the value of the crops. No land or building values would appear in the inventory, and no taxes would be due. The net worth then would be Rs. 5871/— (Rs. 15,628 - 2,425 - 6,000 - 1,500 + 168).

TABLE 4

Summary of the Annual Farm Business Account of the Average-Size Farmer-Owned Home-Farm of a Typical Vocational Agriculture Student in Nepal

Expenditures			Receipts
Labor @ Rs. 5 per day	Days	Rs.	
For 2 bighas rice			
Plowing	35		
Transplant bed	4		
Transplanting	40	200	
Weeding	10		
Harvesting	20	100	
Threshing	15		
Irrigation	10		
	134	300	
For 1 bigha corn			
Plowing	10		
Planting	2		
Hoeing & weeding	15		
Harvesting	5		
	32	0	
For 1 bigha veg.			
Plowing	15		
Planting	5		
Hoeing	15		
Harvesting	10		
Irrigation	5		
	50	0	
For 2 bighas wheat			
Plowing	25		
Planting	4		
Irrigation	3		
Harvesting	15		
Threshing	12		
	59	0	
For 1 bigha mustard			
Plowing	10		
Planting	2		
Irrigation	2		
Harvesting	5		
Threshing	2		
	21	0	
Total Labor:	296	300	

(Table 4 continued on following page)

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TABLE 4 (continued)

Expenditures			Receipts
Fertilizer	Pounds	Rs.	
For 2 bighas rice			
Nitrogen (20%)	80	28	
Phosphate (20%)	40	14	
	120	42	
For 1 bigha corn	0	0	
For 1 bigha vegetables			
Nitrogen (20%)	60	21	
Phosphate (20%)	40	14	
Potassium (51%)	20	8	
	120	53	
For 2 bighas wheat			
Nitrogen (20%)	120	42	
Phosphate (20%)	60	20	
	180	62	
For 1 bigha mustard	0	0	
Total Fertilizer:	420	157	
Insecticides	Pounds	Rs.	
For 2 bighas rice	0	0	
For 1 bigha corn	0	0	
For 1 bigha vegetables	-	5	
For 2 bighas wheat	0	0	
For 1 bigha mustard	0	0	
Total Insecticides:	-	5	
Total Expenditures:			
Labor 296 Days - 1/		Rs. 300	
Fertilizer 420 pounds		Rs. 157	
Insecticides 2/		Rs. 5	
Taxes		Rs. 168	
Total Cash Expenditures: 3/		Rs. 630	

(Table 4 continued on following page)

1/ Of the 296 days of labor required, 60 days were hired at Rs. 5 per day. The remainder of the labor was provided by the operator and family.

2/ Small amounts undetermined.

3/ Assuming that the farmer had his own seed from the previous year's crop.

TABLE 4 (continued)

Receipts

Item	Pounds Sold	Rs.	Pounds kept At Home	Value Rs.
Rice	400	200	3,600	1,800
Corn	0	0	1,000	500
Vetetables	50	100	700	350
Wheat	1,200	720	1,200	720
Mustard	800	800	100	100
Total Receipts:	2,450	1,820	6,600	3,470

SUMMARY OF BUSINESS

Receipts; Rs. 1820 plus Rs. 3470 worth of food and grain for home use.
Expenditures: Rs. 630 plus 236 days of operator and family labor.
Net Income: Rs. 1190 plus Rs. 3470 worth of food and grain for home use.

Goals for Vocational Agriculture Students

All formal vocational agriculture training in Nepal has taken place in the past decade. Past goals have been directed primarily toward providing necessary and adequate training to the future farmers of Nepal that would enable them to:

1. Learn modern agricultural technology.
   a. Soils.
   b. Crops.
   c. Fruits.
   d. Vegetables.
   e. Animal science.
   f. Poultry.
   g. Agricultural mechanics.
2. Develop skills that would enable them to earn a living.
3. Produce agricultural products efficiently and profitably.
4. Become independent and productive citizens of Nepal.
5. Provide full employment for the labor force of Nepal.
6. Grow food for themselves and have some left over for sale.
7. Improve the standard of living of Nepal.
8. Improve the overall economic situation of the farmers of Nepal.
9. Improve the overall social adjustments taking place in Nepal.

Vocational agriculture in Nepal really is only beginning. As a result of the short time that it has been offered to the potential farmers of Nepal, the goals have not yet been reached. Some schools have not yet acquired the facilities, equipment, and supplies

needed for an optimum vocational agriculture training program. Regardless, the future goals of vocational agriculture in Nepal should be considered. As farmers gain the necessary technology to meet present goals, agriculture in Nepal will come to mean more than merely working on the farm.

As agricultural technology increases in Nepal, opportunities will arise for agriculturally-trained young men to supply the farmer with the resources for production, and to help in moving products from farm to consumer. Future curriculums of vocational agriculture should provide the training necessary to qualify young men to engage in agricultural supply business. This means that agricultural training will be needed by people who do not work directly on the farm.

Chapter III

PRESENT CONDITIONS CONFRONTING GRADUATES FROM VOCATIONAL AGRICULTURE

It has already been stated, and is widely recognized, that the Nepalese economy is based upon agriculture. If economic conditions in Nepal are considered to need improvement, it appears most logical to improve that which makes up the major part of the total economy — agriculture.

An attack on the problem has been made. However, all Nepalese people should ask themselves the following questions relative to this attack:

1. Are we really exerting the necessary efforts and resources that we should in attacking the problems of the most important part of our economy?

2. Should we devote our efforts to agriculture, the most important part of our total economy, or should we devote our efforts and resources to a search for some other industry that might help Nepal?

3. Are we really looking into the future and planning to offer training to students in vocational agriculture today that will enable them to produce the food, supply the farmers with their needs for production, and deliver the farm products to the future consumers?

4. With an ever-increasing number of people in Nepal, and no more land to become available, are we offering adequate training and opportunities to our future farmers that will enable them to produce an adequate amount of food for the people of the nation?

As mentioned previously, vocational agriculture in Nepal has been offered, as a whole, for much less than a decade. What the graduates can do, when the program is in full operation, remains to be seen.

If the program is successful, vocational agriculture graduates must be given every possible opportunity to become employed in agriculture, both on the farm and in all agriculturally-related occupations. It is realized that more education will be required for graduates to become qualified for some occupations.

The future of the agricultural economy of Nepal depends upon the success of the recently-initiated vocational agriculture program. Final evaluation of the program will be based on whether or not graduates succeed in agriculture and agriculturally-related occupations or businesses.

The success of graduates may be determined in part by a review of conditions in certain existing and potential agricultural occupations in Nepal at present, and in the future.

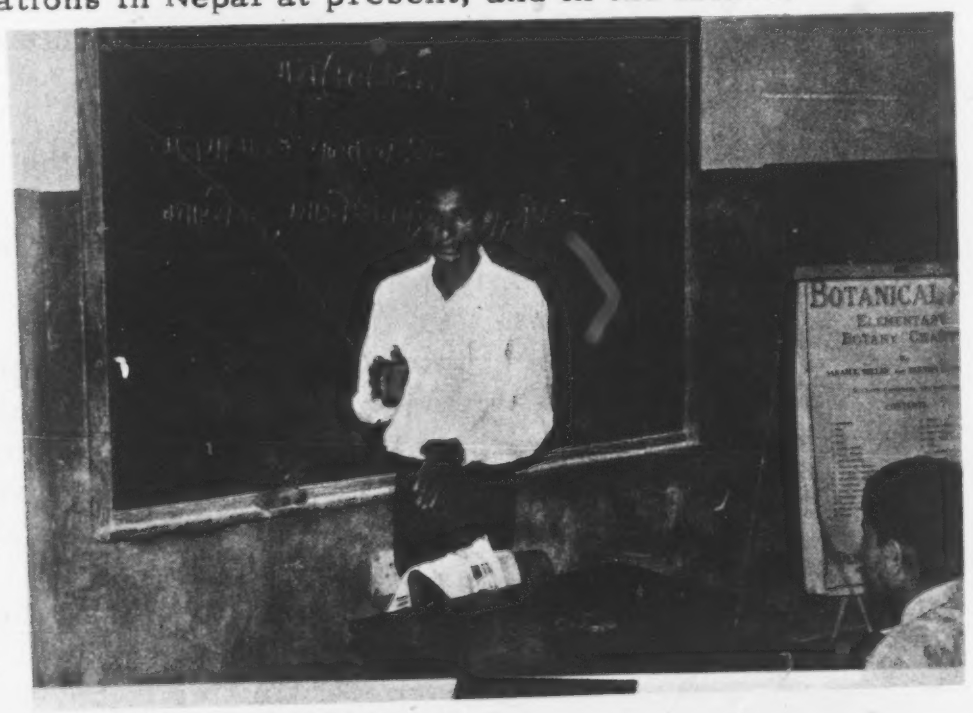

Fig. 16— College graduates in agriculture have an excellent opportunity to become vocational agriculture teachers in the multipurpose schools.

Farming:

1. The lack of land will probably prevent 30 percent of the present students now taking vocational agriculture from even having a chance to farm.

2. There is an inadequate amount of water for irrigation, and this limits yields and profits.

3. Lack of capital prevents the farmer from adopting improved technology.

4. As a result of items 1, 2, and 3, parents attempt to discourage their sons from becoming farmers, preferring that they become "white-collar" workers.

Teaching:

1. Teaching positions in vocational agriculture are limited because of the small number of schools offering vocational agriculture.

2. Teachers' salaries are less attractive than those of government workers.

3. Colleges and universities are needed that will offer more courses in technical agriculture for future vocational agriculture teachers.

4. More high schools should offer vocational agriculture, and courses for adult farmers.

5. More extension workers are needed to work with the farmer on his farm — supervised farming for adults.

Farm Management:

1. At present, only a few men are employed as farm managers, and they are employed on government farms.

2. Owners of small farm businesses need access to such trained men, but they have had no opportunity to learn about the benefits such men could offer them. They are unaware that 50 to 60 farmers could cooperatively hire such a person.

3. Nepalese farmers need the opportunity to observe the profits that can result by the use of a good farm manager as needed.

Farm Consulting:

1. At present, there are few trained men to whom a farmer can go for advice.

2. The skills involved in the training of such a person, as well as the services offered, are much the same as those for farm management.

Farm Finance:

1. Few such jobs are open at the present time to high-school graduates.

2. Most of the people working in farm finance are not trained in agriculture.

3. With farm capital such a major problem, there is a great need for adequately trained farm finance specialists.

Agricultural Marketing:

1. Most marketing of agricultural products is done by business men and government workers. Few, if any of these men have had agricultural training.

2. Few, if any, jobs in agricultural marketing are presently available to high school graduates.

Government Agriculturalists:

1. Jobs with the government are limited for the high-school graduate.

2. Some jobs are available away from home as Junior Technical Assistants.

3. There is little chance for promotion, and the salary is quite low.

4. Better jobs are available to men with additional education.

Agricultural Sales

1. At present, agricultural sales are handled by business men and government workers.

2. These men are not agriculturally trained and do not necessarily know the amounts of fertilizer to advise the farmer to buy, insecticides to use, or varieties of seeds to provide.

Agriculturally trained men in the areas previously discussed are necessary if the agricultural economy of Nepal ever is to reach its optimum potential. Many young men of Nepal are eager for the opportunity to accept the challenge of acquiring the necessary education to qualify them for occupations in these areas. Given the opportunity, young men with proper agriculture training will improve the agriculture of Nepal. Since agriculture is so vitally important to the total Nepalese economy, all of Nepal will benefit therefrom.

Chapter IV

PRINCIPLES OF TEACHING AND LEARNING

How People Learn

The objective of all good teaching is to help students to learn. Learning is defined herein as changes in behavior which result from experiences. Learning may be said to have occurred when the student's actions and behavior are governed by all relevant information made known to him.

Education has at least three distinct purposes:

1. Discovery of new knowledge.
2. Dissemination of existing knowledge.
3. Translation of facts and knowledge into action by the student.

First, research in the areas of agriculture, engineering, psychology, etc., produces new facts. This research usually is done by universities, government agencies, or industrial research facilities.

Second, new information should be made available to those who can use it effectively. Dissemination usually is accomplished thru textbooks, manuals, bulletins, workshops, and special courses.

Third, after ideas and knowledge have been shared, it becomes the responsibility of those who teach to see that students translate this information properly and effectively into action. The vocational agriculture teacher must help his students accept this knowledge so completely that all the farming they ever do is affected by these facts. Facts and knowledge are important only as

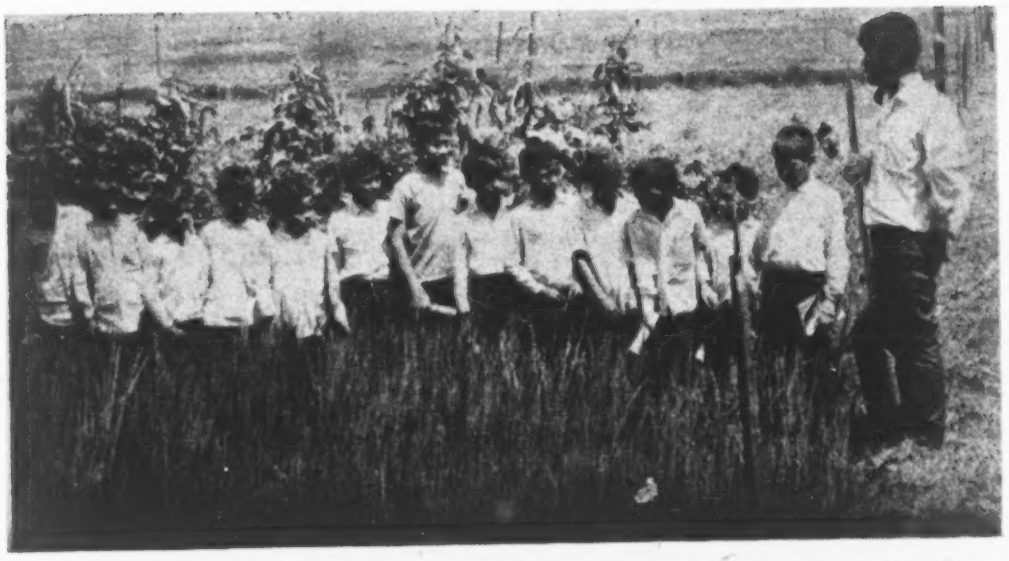

Fig. 17— Through both classroom and field activities, the vocational agriculture teacher shares his specialized knowledge with his students.

long as they influence what people do. Agriculture students in their training must learn to do as well as to know.

This is the basic nature of the vocational agriculture teacher's job; it is why he teaches. With the proper knowledge and skill, he approaches the student with the responsibility to teach him to farm according to the facts that are known. Teaching, therefore, is mainly a communication problem. Teaching and communication are almost synonymous.

Communication occurs at different levels. The teacher may say, "put 60 pounds of ammonium sulfate on each bigha of rice." The student may receive this communication and be able to repeat it. Communication has taken place, but little learning has resulted.

Communication at the understanding level goes far beyond the mere receipt of information—ideas must be comprehended. The teacher who tells the student to "put 60 pounds of ammonium sulfate on each bigha of rice" and fully explains the percentage of nitrogen in ammonium sulfate, the nitrogen needs of rice, and the resulting increases in yield and profit above the cost of the ammonium sulfate, has directly controlled the student's behavior and at the same time has built an understanding of the correct procedures on calculating the amount of nitrogen to use. This type of

Fig. 18—Teaching and learning are not confined to group situations. Often, they are extremely effective when the teacher works with one individual.

communication goes directly to the action required and the reason for it. Learning has occurred when the student's actions and behavior are governed by all relevant information made known to him.

Perception: Perception is the basis of all learning. Bits of information, called perceptions, may be directed to the brain by any one or combination of the senses. The senses are the doors to the human brain.

The average student will use some or all of his senses, either correctly or incorrectly, in all learning situations. However, the good teacher will call attention to what the student should expect to see, hear, feel, smell, or taste in advance of, and during, each learning situation. Not all senses are used in every learning situation. A few obvious examples of the use of senses follow:

Fig. 19—Classroom discussions should be followed by opportunities for the students to handle livestock, thus promoting "learning by doing."

1. Seeing the external parts that make up a good cow, pig, goat, or sheep.
2. Hearing the appropriate sound of an engine in good or poor operating condition.
3. Feeling the correct pressures necessary in driving a farm power unit, or feeling the desired soil texture and structure.
4. Smelling the desired odor of stored grain or cured hay.
5. Tasting for the desired stage in the processing or manufacturing of dairy products (milk, cream, butter, or cheese).

Perceiving involves more than the reception of sights and sounds. Perceptions result when a person gives meanings to the sights and sounds which come his way. Real meaning comes only from within a person, because the meaning derived from information furnished by the senses may depend on many factors within each person concerned. Because perceptions are the basis of all

learning, a knowledge of the factors which affect the perceptual process is very important to every vocational agriculture teacher.

The most important factors affecting a student's perceptions are:

1. His physical organism.
2. His needs and requirements.
3. His goals and values.
4. His self-concept.
5. The time and opportunity for perception.
6. The element of threat.

Physical Organism: The physical organism is the vehicle by which the individual becomes aware of and operates in the world of which he is a part. A vocational agriculture student must be able to see, hear, and to respond adequately.

Needs and Requirements: Man's basic need is to maintain and enhance his organized self, including his past, present, and future. Self is both physical and psychological. Man's most fundamental and pressing need is to preserve and perpetuate this self, and all his perceptions are affected by this need.

The food a man eats and the air he breathes become parts of the physical self. The sights a man sees and the sounds he hears become parts of the psychological self. Psychologically, a man is what he perceives. He has physical barriers that keep out those things that might damage his physical being, such as blinking at an arc-weld in the farm shop, or flinching from a piece of hot metal. Likewise, he has perceptual barriers that block those sights, sounds, and feelings that threaten him in a psychological way.

Helping students to learn requires finding ways to aid them in developing better perceptions in spite of their defense mechanisms. Since man's basic need is to maintain and enhance his self, the teacher must realize at all times that anything he asks or tells the student that may be interpreted by the student as imperilling this self will be resisted or denied. A good vocational agriculture teacher will work with this force, rather than against it.

Goals and Values: Perceptions depend on one's goals and values. Every experience and sensation received by the nervous system is biased by the individual's own beliefs and value structures. Spectators at a football game see infractions or fouls differently,

depending on which team they support. The good vocational agriculture teacher must know the kinds of commitments and philosophical outlooks his students have in order for him to know how they will interpret his teaching.

Motivations also are a product of a student's value structure. Those things which are highly valued and cherished are pursued. Those which are accorded less value and importance are not sought after. Motivations are among the most important factors in learning. They are affected by many other factors also, to be discussed later in greater detail.

Self-Concept: A student's image of himself, described in such terms as "confident" or "insecure," greatly affect his perceptual process. If the vocational agriculture student's experiences tend to support his image of himself as a farmer or agriculturist, he remains receptive to further agricultural experiences. If he has negative experiences that destroy his self-concept, he tends to reject further agricultural training.

Negative self-concepts inhibit the perceptual processes by introducing psychological barriers which tend to keep the student from receiving them and then perceiving what the teacher intends. They may even inhibit the ability to properly implement that which is perceived. They affect unfavorably the "ability to do," Students who view themselves positively are less defensive and more ready to assimilate all teaching and demonstrations offered.

Time and Opportunity to Perceive: Learning some things depends on other perceptions that have preceded these learnings, and on the availability of time to sense these new things and relate them to earlier perceptions. Making most effective use of available time is a basid problem of teaching. Other factors besides length and frequency of teaching periods affect the rate of learning. The effectiveness of the use of a properly planned course is proportional to the consideration it gives to the time and opportunity for perception.

Element of Threat: Threat restricts perception. Fear affects adversely a student's perception by narrowing his perceptual field. With a threat, the student tends to limit his attention to the source of threat. All his perceptual faculties are focused on that which generates his fear. Anything the teacher does which is seen

by the student as threatening makes him less able to accept experiences the teacher is trying to provide.

The effective instructor is one who can organize the logic of his teaching to fit the psychology of the learner. Learning is a psychological problem, not a logical one. To frighten a student by threatening him with reprisals or unsatisfactory reports may make sense logically, but it is ineffective psychologically. If a situation seems to overwhelm him, the student feels unable to handle all factors involved, and a threat exists. So long as he feels capable of coping with a situation he recognizes, each new experience is viewed as a challenge.

Realizing that behavior is a function of the way the individual perceives, and knowing that perceptions are affected by any and all of these factors, a good vocational agriculture teacher can facilitate the learning process by avoiding actions that negate attainment of teaching goals. Teaching is consistently effective only when the factors influencing perceptions are recognized and taken into account.

Insight: Insights involve grouping perceptions into a meaningful whole. Evoking these insights is the vocational agriculture teacher's major responsibility. To ensure that these occur, it is essential to keep each student constantly receptive to new experiences, and to help him realize the way each piece relates to all other pieces of the total pattern of the task to be learned.

Understanding the way each perception may affect all the others, and knowing the way a change in any one of them may bring about changes in all the others is imperative to true learning. This mental relating and grouping of associated perceptions is called insight. Insight is basic to true learning.

Insights will almost always occur, eventually, whether or not instruction is provided. For this reason, it is possible for a person to become a farmer through trial and error if he supervises his exploratory actions, just as one may become a lawyer by "reading law." Teaching, however, speeds this learning process by pointing out the relationship of perceptions as they occur, and so promoting the development of insights by the student.

As perceptions increase in number and are assembled by the student into larger "blocks" of learning to become insights, learning becomes increasingly meaningful to him, and more permanent. Forgetting is less a problem when there are more anchor points to which one can tie his insights. It is a major responsibility of the teacher to organize his demonstrations and explanations and direct student practice so that the learner has better opportunities to understand the interrelationships of the many kinds of experiences he has perceived. Pointing out relationships as they occur, providing a secure and non-threatening environment in which to learn, and helping the student to acquire and maintain a favorable self-concept are most important in fostering development of insights.

Motivation: Motivation is probably the dominant force governing the student's progress and ability to learn. Motivations may be tangible or intangible, negative or positive, very subtle and difficult to identify, or quite obvious.

Negative motivations are those which may engender fears and therefore be accepted by the student as threats. While they have their uses in limited situations, such as the instruction of a "captive" group, they are characteristically less effective than positive motivations in promoting efficient learning.

Positive motivations are provided by the promise of achievement or rewards. These rewards may be personal or social; they may involve financial gain, satisfaction of the self-concept, or public recognition. Some motivations that can be used to advantage by the vocational agriculture teacher include the desire for personal gain, the desire for personal comfort or security, the desire for group approval, and the achievement of a favorable self-image or sense of accomplishment.

The desire for personal gain, either the acquisition of things of position, is a basic motivation for all human endeavor. A man may be motivated to dig a ditch or to increase his crop yields only by the desire for financial gain.

Vocational agriculture students are like all other workers in wanting a tangible return for their efforts. These returns, whether they are to be financial, self-interest, or public recognition, must constantly be apparent to the student during his instruction.

Many lessons with objectives that are not obvious will pay off well during later instruction, but the student may not appreciate this fact. It is important that the instructor make him aware of those applications which are not immediately apparent if the student's motivation is to be maintained. Likewise, the teacher should avoid devoting much time and effort to drill and practice on operations which do not directly contribute to good farming.

The desire for personal comfort and security is a motivation often inadequately appreciated in vocational agriculture instruction. All students want secure, pleasant conditions and states of being. If they recognize that what they are learning may promote this objective, it is easier to attract and hold their interest. Insecure and unpleasant training situations retard learning.

All people want to avoid unnecessary pain and suffering. The vocational agriculture student will apply himself to learning actions and operations if he realizes that they may help to keep people from starving.

Fig. 20—School farm crops should be superior in all respects. This goal helps to inspire high levels of motivation in the students.

The attractive features of the activity to be learned can provide a powerful motivation. Students are eager to learn skills that may be used to advantage on their home-farms. If they can be made to understand that each learning task to which they are directed will be useful in preparing for the activities for which they undertook vocational agriculture training, they will be eager to pursue it.

Group approval is a strong motivating force. Every man wants the approval of his friends and superiors. His interest can be stimulated and maintained by building on this natural force. Most students enjoy the feeling of belonging to a group, and are interested in achieving results that will give them prestige among their fellow students. If the student respects his vocational agriculture instructor as a person and has confidence in his ability, he will value his approval, also.

In group instruction, praising and giving credit to students who have performed well not only encourages those praised but also motivates others in the group to greater efforts.

Every man seeks to establish for himself a favorable self-image. This self-image may be submerged in a feeling of insecurity or despondency which results in expressions of self-negation. If the prospective student approaches vocational agriculture training with an outlook of "I'd like to farm, but I don't think I could ever learn to do it", probably he would never be able to learn to do it well if this expression described his true belief.

Fortunately, somewhere within each person who addresses himself to any task is the belief that he can succeed under the proper combination of circumstances and good fortune. It is this belief in his own capability, and the desire to confirm it, that can be the most powerful motivating force for any but the genuinely timid student.

Positive motivation is essential to true learning. Negative motivations in the form of reproof and threats should be avoided with all but the most overconfident and impulsive students. Slumps in learning often are due to slumps in motivation. Motivation does not remain at a uniformly high level, and may be affected by out-

side influences such as physical or mental distrubances, or inadequate teaching. The vocational agriculture teacher must tailor his instruction to the maintenance of the highest possible level of motivation, and should be alert to detect and deal with relapses in motivation which originate outside the school.

Obstacles to Learning: Obstacles to learning are numerous and varied. They may range from disinterest and distractions to complete mental blocks; they may originate from such different sources as the student's family troubles and his misconceptions based on previous teaching. Among those obstacles which have been recognized as major factors to be considered by vocational agriculture instructors are:

1. A student's feeling of unfair treatment.
2. Imaptience to proceed to more interesting operations.
3. Worry or lack of interest.
4. Physical discomfort, illness, or fatigue.
5. Apathy fostered by poor instruction.
6. Fear, anxiety, or timidity.

Unfair Treatment: A student who believes that his teacher is not interested in him, or that his efforts are not conscientiously considered and evaluated, will not learn well. If a student develops the idea that his presence is unwelcome to the teacher, or that the teacher would rather spend his time with other students or at other duties, his motivation will suffer no matter how intent he is on learning to farm.

Motivation will suffer also when a student believes that his teacher is making unrealistic demands for performance and progress. The assignment of goals that the stucent considers difficult but possible usually provides a challenge which promotes learning. The assigning of impossible goals discourages the student, diminishes his efforts to perform adequately, and retards the learning process.

Impatience: Impatience is a greater deterrent to learning than is generally realized. The impatient student fails to understand the need for preliminary training, and he seeks only the ultimate objective without considering the means necessary to reach it.

Impatience to learn can be corrected by the teacher only by presenting the necessary preliminary training one step at a time, with clearly-stated goals for each step. The procedures and elements mastered in each step should be clearly identified in demonstrating the performance of the subsequent step.

Impatience can result from instruction, keyed to the pace of a slow learner, applied to an apt student or a characteristically fast learner. It is just as important that a student be advanced to the subsequent step as soon as one goal has been attained as it is for him to complete each step before the next one is undertaken. Disinterest grows rapidly when unnecessary repetition and drill are required on operations that have been learned adequately.

Worry or Lack of Interest: A student who is worried or emotionally upset does not learn well, and he will derive little benefit from any teaching while he is in this condition. His worry or distraction may be due to his concern about progress in school, or it may stem from circumstances completely unrelated to school. Significant emotional upsets may be due to personal problems, psychiatric disturbances, or antipathy toward the teacher or what is being taught.

The student's experiences outside his school activities affect his behavior and performance in training — the two can not be separated. When he comes to school, he brings with him his interests, his enthusiasms, his fears, and his troubles. The teacher can not be responsible for these outside diversions, but he can not ignore them because they affect vitally the results of his teaching. Instruction must be keyed to the utilization of the interests and enthusiasms the student brings with him, and to diverting the student's attention from his worries and troubles to the learning tasks at hand. This is difficult, but it must be accomplished if learning is to proceed at a normal rate.

Worries and emotional upsets resulting from the course at hand can be remedied. Such occurrences usually are evidence of inadequacies on the part of the course or of the teacher concerned. The most effective cure is prevention. The teacher must be alert to see that each student understands the objectives of each step of his training, and that he knows at the completion of each lesson.

exactly what his progress and deficiencies have been. Discouragement and emotional upsets are rare when the student feels that he is a genuine party to his training and that nothing is being withheld from him or is being neglected.

Physical Discomfort, Illness, or Fatigue: Any one or all of these conditions on the part of a student will materially slow the rate of learning. A student who is not completely at ease, and whose attention is diverted by discomforts such as extremes of temperature, poor ventilation, inadequate lighting, or noise and confusion, cannot learn at his normal rate. This is true no matter how diligently he tries to apply himself to the learning task.

Illness, such as a cold, or major illness or injury, will interfere with the normal rate of learning. No effective teaching can be conducted for students incapacitated by illness.

The detection of fatigue in a student is important to competent teaching. This is important both in assessing the student's performance early in a lesson when he may be suffering from inadequate rest the night before, as well as in recognizing deterioration of his performance resulting from continued, intensive concentration on a complicated task. Once fatigue occurs as the result of application to a learning task, relief should be offered by a break in instruction and practice, or by a change of pace.

Instruction should be continued only so long as the student is alert, receptive to instruction, and his level of performance continues to be consistent with his experience.

Apathy: A student develops apathy rapidly when he recognizes that the teacher has made inadequate preparation for the instruction he is giving, or when this instruction is deficient, contradictory, or appears insincere. To hold the student's interest and to maintain the motivation necessary for efficient learning, well-planned, appropriate, and accurate instruction must be provided. Nothing destroys the interest of a class so quickly as the "Let's see now, what did we do yesterday?" approach to a class period.

Even inexperienced students realize immediately when the instructor has failed to prepare properly a lesson he is trying to

teach. Poor preparation leads to spotty coverage, misplaced emphasis, repetition, and a complete lack of confidence on the part of the students.

Teaching may be overly explicit and so elementary as to fail to hold student interest, or it may be so general or complicated that it fails to evoke the interest necessary for effective learning. The teacher must teach for the level of the students if he is to be effective. This does not mean that he must lower his own standards to that of the students. He must adjust his presentation to be meaningful to the students for whom it is intended.

Poor presentation of instruction may result not only from poor preparation, but also from distracting mannerisms, personal untidiness, or an appearance of irritation with the class. Permitting the impression that he is "talking down" to the students is one of the surest ways for a teacher to lose their confidence and attention. Once the teacher loses confidence and attention, the student's learning rate is unnecessarily retarded.

Fear, Anxiety, or Timidity: Any one, or all of these place additional burdens on the vocational agriculture teacher if he is to teach effectively. These are obstructions that limit the student's perceptive ability; and they retard the development of insights from those perceptions which enter his consciousness.

The student must be comfortable, confident of his teacher, and at ease if he is to learn effectively. Providing this atmosphere for learning is one of the most important tasks of the vocational agriculture teacher. Although doing so may be difficult at first, successive accomplishments of recognizable goals, and the avoidance of alarming occurrences or situations will rapidly improve the student's ease of mind. This is true of all students, but it may require special handling by the vocational agriculture teacher for only obvious cases.

Habits and Transfer: Learning by developing perceptions and combining them into insights is a process of forming performance habits. Transferring habits formed in one task to performance of more complicated subsequent tasks is transfer. Habits considered

here are such small elements of performance as using hand tools properly. The influence of these small habits in the student's learning of subsequent tasks is called "transfer."

Transfer is considered to be either positive or negative. Positive transfer describes an element of performance of the subsequent learning task. Negative transfer describes an element of performance that hinders, or at least does not aid, correct performance of the new task.

Formation of correct habit patterns from the beginning of any learning process is essential to further learning and to correct performance after the completion of training. It is, therefore, the responsibility of the vocational agriculture instructor to insist on correct procedures from the beginning to provide proper habit patterns. He will find it much more difficult to correct faulty habits later than to foster correct habits from the beginning.

This is the basic reason for the "building block" technique of teaching, in which each simple task is performed acceptably and correctly before the next learning task is introduced. Introduction of instruction in more advanced and complex operations before initial instruction is mastered leads to development of poor habit patterns in the elements of performance. Faulty performance of the elements inevitably is carried through to all future learning and farming operations.

Levels of Learning

Learning may be accomplished at any of many levels:

1. The lowest level of learning is the ability to repeat without understanding something one has been taught or being able to apply what has been learned.

2. Progressively higher levels of learning are:

   a. Understanding what one has been taught.
   b. Achieving the skills to apply what one has learned and to perform correctly.

c. Associating and correlating what one has learned with other things previously learned or subsequently encountered.

The highest level of learning — which should be the objective of all teaching — is that level at which students become able to associate any element they have learned with other segments, or "blocks" of knowledge or accomplishment. The other segments may be items or skills previously learned, or new learning tasks to be undertaken in the future.

The vocational agriculture teacher must require his students to achieve at least the knowledge and skill to apply correct procedures for ea h lesson taught. Learning will be accelerated and the students will become more competent and resourceful farmers if they further learn to associate the elements of each segment of their learning with all other related skills and bits of knowledge, and to correlate the application of their elements with other learning and operational tasks.

Rates of Learning

It would be very convenient if the rate of learning were uniform and predictable. However, it is not. Students may progress rapidly for a time, then suddenly progress more slowly, or even retrogress for a period of time. Such variations are to be expected, but it is the responsibility of the teacher to detect them as soon as possible and to try to eliminate their causes by redirecting his instruction to level them out as much as possible.

Advances and Plateaus in Learning: Usually, learning proceeds rapidly when a new task first is introduced. It then slows as a reasonable degree of proficiency is achieved. When plotted on a graph, this decrease in the rate of learning is shown as a leveling off of the ascending line representing learning progress. As the student achieves the ability to correlate what he has learned with other bits of learning, progress tends to be resumed, and the line on the graph resumes its upward climb at a slower, but fairly uniform rate.

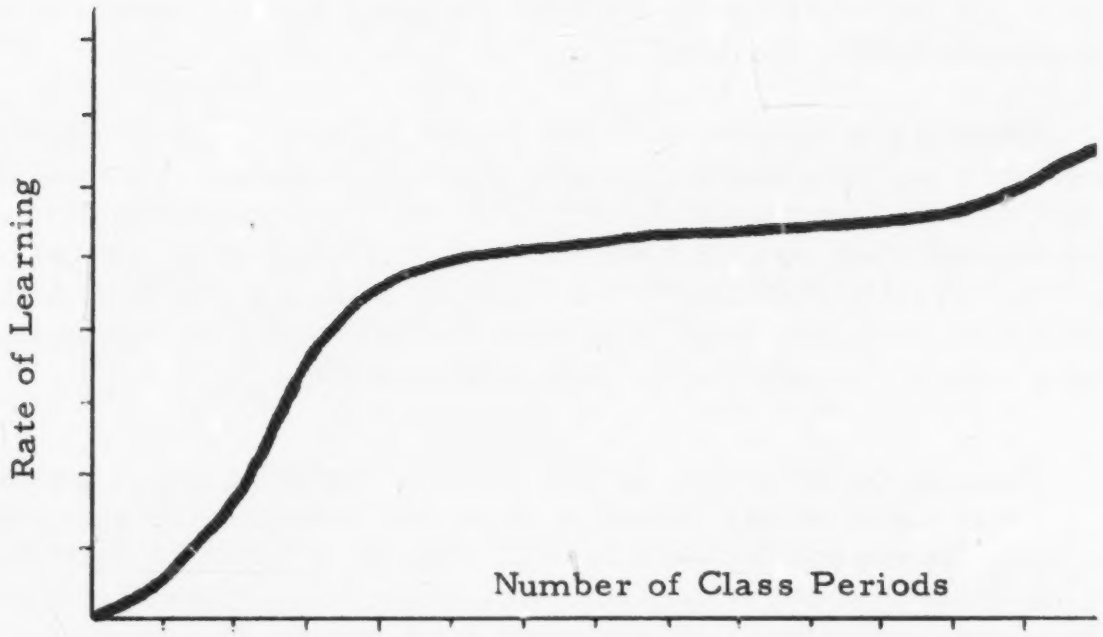

Fig. 21—A typical learning curve, showing a plateau.

The level, or relatively level, portion of the learning curve on the graph is termed a "plateau." It may represent a period of learning during which the student is perfecting his ability to apply the new skill he is learning, and he has not yet awakened to its application to and correlation with other learning tasks. Figure 21 illustrates a typical learning curve, showing a plateau in the learning of a mechanical operation.

The typical learning curve rises rapidly as a new learning task is introduced, levels off as skill and knowledge are achieved, and then continues its rise at a slower, but steady rate as the student learns the associations and correlations of his newly acquired accomplishment. Actual learning curves rarely follow exactly the classical, or ideal, curve.

The rate of progress in learning is affected by so many outside influences that it seldom is predictable. The rate of learning is affected adversely by diversion, lagging motivation, emotional disturbances, equipment breakdowns, and unavoidable absences. The good vocational agriculture instructor can counter these in-

fluences on learning by careful planning and by redirection of emphasis in his teaching.

Temporary random plateaus in the learning rate are not necessarily serious, and they can be expected with all students. Each one should be examined carefully to identify any contributing influences that can be countered. The teacher must be aware of characteristic plateaus in the learning process. He must be prepared to evaluate their significance when slumps occur and to take corrective measures when appropriate.

Slumps, or plateaus, in the rate of learning are more likely to occur as students advance to more complicated operations. Often, the reason for this is that they have failed to master one element of the operation. This leads to the appearance of deficiency in the performance of all elements involved. Improvement usually becomes normal again when this one element is mastered. The vocational agriculture teacher can accelerate this improvement by identifying the element which is disturbing the student and concentrating his teaching on that one phase of the operation concerned.

Without proper teaching, the student probably will not understand why he is showing no improvement, and will become discouraged. This discouragement tends to prolong the plateau. During such periods of discouragement, the teacher should step in to isolate and correct the difficulty, and to provide special incentives that will maintain the student's interest until normal progress is restored.

Reversals sometimes occur during which performance becomes worse. Benerally, such reversals are due to a faulty habit pattern involving one of the basic elements of the operation involved. This habit causes the student repeatedly to practice an erroneous performance until correction is very difficult. The vocational agriculture teacher must not accept such errors and misunderstandings as normal plateaus in the learning process. They must be corrected to ensure further progress.

Reversals in the rate of progress can occur also when a teacher places too much emphasis on a single phase of study to the exclu-

sion or subordination of consideration of its overall performance and objective, except for the correction of specific deficiencies in performance. An example is concentration on the cleanliness of the farm show with a resulting poor performance in doing some of the "messy" jobs.

Memory and Forgetting: One key to the achievement of satisfactory progress in learning is attention to the principles related to remembering and forgetting. In considering the role of memory in learning, one soon encounters the great area of overlap between conscious memory, as we think of it, and habit patterns. Actually, as they are reinforced by constant use, our memories become established as habit patterns, and so become a part of us.

Each bit of information or element of performance remembered is a potential habit pattern. The ability to remember disassociated bits of information not regularly used, such as names or addresses, is a faculty with which we all are not favored. The most reliable means for the teacher in assisting his students to remember vital bits of information and performance is to require them to use and associate them as frequently as possible and with many different applications.

Drill, recitation and quizzing assist the students in establishing information in their memories. None of these alone is so effective as continuing use, practice, and application to different situations.

Forgetting is subject to the same considerations as remembering, but with the reverse effect. Bits of information not used or associated with other information tehd to be forgotten quickly. Habit patterns, however, become deeply ingrained in a person's being, and although recall may be difficult, they are always present to some degree. Thus, habit patterns that have been firmly established and cultivated through repeated use are retained, and often will come to the fore in emergencies, even after years of neglect.

Phases of learning which are purely memory work should be recognized and presented as such. Presentation in the simplest possible form will assist students to remember them. Requiring

the student to dig out such information for himself, or assuming that he will eventually run into this information without direction is poor instruction. Making it easier for him to acquire the necessary memory-learning will free the student to concentrate on the more involved skills and mental features of his training.

Most important, attention directed to providing the students with the necessary "memory" information as it is needed, and providing continuing use and associations for this information is essential to fostering a desirable learning rate.

Memory is a major factor in learning. It constitutes essentially all of the learning classified as "knowledge," and it has a basic effect on retention of motor skills. Following are five significant principles generally accepted as having direct application to remembering and, consequently, to learning:

1. Praise stimulates remembering: Responses that give a pleasurable return tend to be repeated. Absence of praise or recognition tends to discourage one, and any form of negativism in the acceptance of a response tends to make its recall less likely.

2. Recall is promoted by association: Each bit of information or action associated with something to be learned tends to facilitate its later recall by the student. Unique or disassociated facts tend to be forgotten unless they are of special interest or application.

3. Favorable attitudes aid retention: Man learns and remembers only what he wishes to know. Without motivation, there is little chance for recall. The most effective motivations are those based on positive or rewarding objectives.

4. Learning with all our senses is most effective: Although generally we receive what we learn through the eyes and ears, other senses also contribute to most perceptions. When several senses respond together, fuller understanding and greater chance of recall are achieved.

5. Meaningful repetition aids recall: Each repetition gives the student an opportunity to gain a clearer and more accurate perception of the subject to be learned; but mere repetition does not guarantee retention. Practice gives an opportunity for learning, but it does not cause it. Further, it is believed that three or four repetitions provide the maximum effect, after which the rate of learning and probability of retention fall off rapidly. This is consistent with the learning curve previously discussed and illustrated.

Common Misconceptions About About Learning

Many misconceptions about learning have developed throughout the years. Some of these are based on partial truths, some on traditional methods, and some even on sadism and domination. None of the misconceptions described should be accepted by any vocational agriculture teacher. In fact, many teachers would maintain that they should not be printed:

1. Some instructors believe that students can be motivated to learn by fear. They apply punishment or threat of punishment as a routine training technique in the belief that scaring students by threats guarantees surer learning.

2. Many students, and some uninformed instructors, believe that learning is hard work, and that people learn only by exerting physical effort. According to this school of thought, the mind must be exercised by unpleasant tasks, and making it easier for a student to learn is contrary to the principles of sound teaching.

3. It is a popular belief that "one picture is worth a thousand words." According to this principle, the presentation of an unexplained picture is more productive of learning than is a written or oral presentation.

4. Many teachers believe that a longer learning experience is more beneficial than a shorter training period, and that the quality of learning depends on the length of time devoted to it. Such people would then believe that

a 60-year-old poor farmer is always better than a 30-year-old good farmer!

5. Some teachers believe that they must "keep students in their place" by refusing to be friendly with them. They believe that a good teacher must "keep his distance" and remain impersonal in order to be effective. It is asserted that students will always take advantage of friendly treatment to "get by" with lower performance standards.

6. Some teachers believe that competition is the key to successful learning. It is alleged that, since competition is the basic "way of life," students look up to the fast learners. Those who are less successful must fail and fall by the wayside.

7. One philosophy of education asserts that all students must experience setbacks and disappointments because failure is a part of life. According to this opinion, the best preparation for life and action includes frustration and failure as a part of learning. Tests should be developed so that no one can get a perfect score.

All these are misconceptions that the vocational agriculture teacher must avoid constantly and watch to be certain that he has not accepted some of them without realizing it. Many of them are prevalent, even in recognized institutions of learning, but all should have been discredited as effective techniques of teaching.

The Role of the Vocational Agriculture Teacher

Learning to farm should be an enjoyable experience. By making each lesson a pleasurable experience the vocational agriculture teacher can maintain a high level of motivation in his students. This does not mean that he must make things easy for them, or sacrifice his standards of performance to please them. Students will experience pleasure from a learning task well done, or from successfully meeting the challenges of a difficult operation.

Fig. 22—The school farm offers opportunities for students to explore farming problems by studying conditions at first hand in the field.

The idea that people must be led to learning by making it easy has no basis in fact. People are not always attracted to something pleasant and easy. Actually, they devote more effort to things that bring rewards, such as self-enhancement and personal satisfaction. People want to feel capable, and they are proud of difficult achievements. A great teacher can motivate his students to tears and sweat without any thought of rancor or unpleasantness.

Learning to farm should be interesting. Sustaining the student's interest can be achieved only by building up his own interest in the goal of each lesson. Knowing the objective of each lesson gives meaning and interest to the teacher's service and to student efforts. Not knowing the objectives involved leads to confusion, disinterest, and uneasiness on the part of the student.

Learning to farm should provide students with an opportunity for exploration and experimentation. They should be allowed time to explore for themselves and evaluate the various elements of each part of the lesson. They must discover their own capabilities and acquire self-confidence. This can be fostered by using alternative presentations for different students so that some students will not feel that they are merely following the footsteps of others.

Learning to farm should be a habit-building period during which students devote their attention, memory and judgment to development of correct habit patterns, Any goal other than a desire to learn the right way makes students impatient of the teaching and practice they need and should be trying to obtain. The vocational agriculture teacher must keep this goal before him, by example, and by logical presentation of learning tasks.

The teacher must be concerned with man's basic drives and desires if he is to become effective. A perceptive teacher of agriculture can make learning to farm an interesting, pleasurable, and rewarding experience.

Once the vocational agriculture teacher is clear in his own mind on the general objectives he seeks, and has an understanding of how people learn, he is ready to teach so that these objectives are achieved and learning is fostered most effectively and efficiently. The procedures described in the following pages have been outlined to assist him in doing so.

Fig. 23—Field work is an essential element of the learning process in vocational agriculture.

Chapter V

EFFECTIVE TEACHING METHODS

Teaching to Help Students Learn

Professionalism in Vocational Agriculture Teaching: The vocational agriculture teacher must really believe in his work if he is to do his best. As long as he is teaching, he should constantly strive to be the best vocational agriculture teacher in the profession, no matter what his final goal in agriculture is to be.

Professionalism in vocational agriculture teaching is necessary if such teachers are to teach effectively, command greater prominence, merit increased responsibilities, and receive higher salaries. Although the word "professionalism" is widely used, it is rarely defined. No single definition can be provided which will encompass all of the qualifications and considerations which must be present before true professionalism can exist. However, the following must always be included:

Professionalism:

1. Exists only when a service is performed for someone or for the common good.

2. Is achieved only after extended training and preparation.

3. Is based on study and research.

4. Presupposes an intellectual requirement. The professional must be able to reason logically and accurately.

5. Requires the ability to make good decisions. The professional can not limit his actions and decisions to standard patterns and practices.

6. Demands a code of ethics. The professional must be true to himself, and to those he serves. Anything less than sincere performance is quickly detected, and immediately destroys his effectiveness.

The vocational agriculture teacher should carefully consider this list. Attempts to teach without any one of the qualities listed can result only in poor performance and deficient students. Preparation and performance as a vocational agriculture instructor with these qualities constantly in mind will soon command recognition as a professional in the field of agriculture and vocational agriculture teaching.

The Teacher-Student Relationship: The vocational agriculture teacher's first step is to gain the confidence of the students. If he fails to do this, all of the teaching he does will be less effective than it could have been. Gaining confidence and respect is very much a personal matter. Consideration for the student point of view and personal interest, and careful planning for each class period are essentials without which student confidence is quickly lost.

From the first class meeting, the vocational agriculture teacher must attempt to analyze carefully and correctly the personality, thinking, and ability of each student. No two students are alike, and the methods of teaching cannot be equally effective for all students. His methods of teaching may change as the students advance through successive stages of training.

An instructor who has not correctly analyzed his students may soon find that his teaching is not producing the desired results. This could, mean for example, that he has analyzed as a slow thinker a student who actually is a quick thinker but hesitant to act. Such a student may fail to act at the proper time, even though he has correctly understood the situation and knows the situation, because he lacks confidence in his own judgment or capability. The correction would obviously be teaching directed toward developing his self-confidence, rather than drill on fundamentals.

The slow student requires teaching methods which combine tact, keen perception, and delicate handling. If he receives too much help and encouragement, he may develop a feeling of incompetence. Too much criticism of his performance may completely subdue a timid person, whereas brisk instructions may force him to apply himself more diligently.

A student whose slow progress is a result of discouragement and a lack of confidence should be assigned "sub-goals" which can be attained more easily than the normal learning goals. For this prupose, complex farm operations can be separated into their elements, and each element practiced until an acceptable performance is achieved before the whole operation is attempted. As the student gains confidence and ability, his goals should be increased in difficulty until his progress is normal.

Apt students also can become a problem. Because they make few mistakes, they may soon assume that correction of errors is unimportant. Such overconfidence soon results in faulty work habits. For such students, the good teacher will constantly raise the standard of performance for each lesson, demanding greater efforts from them.

Man learns when his errors become known to him. Students who are permitted to complete every lesson without correction and guidance will fail to retain what they have practiced as well as they would if they had their attention constantly called to an analysis of their performance. This does not mean that deficiencies must be invented for their benefit. Unfair criticism immediately destroys student confidence in the teacher.

Students constantly should be aware of their progress. Failure by an instructor to communicate to the students his evaluation of their progress establishes a barrier that blocks further effective teaching. This does not mean that students must be presented with grade slip at the end of every class. Many students have a natural awareness of their progress, and can derive from the teacher's directions, corrections, and comments a very accurate idea of their progress. Others may be less perceptive, and require an actual review and evaluation of their progress at various times in order to satisfy their needs.

The demands on a vocational agriculture teacher to serve as a practical psychologist are much greater than is generally realized. Only by a keen analysis of his students, and a continuing deep interest in them, can he live up to his responsibilities.

The Teaching Process

There are four basic steps in the teaching process:

1. Preparation.
2. Explanation and demonstration.
3. Trial and practice.
4. Review and evaluation.

These four basic steps in teaching often are explained in different sequence, or broken down into greater detail, but they are always recognized in any serious consideration of the teaching process.

Preparation: The preparation necessary for each lesson includes the teacher's determination of what is to be covered, the objectives of the lesson, and the goals which he hopes to attain. It may also include home study or other special preparation by the student for the scheduled lesson.

The teacher's lesson plan may be prepared mentally in the case of an experienced teacher planning a simple period of teaching, or it may be worked out with care and prepared in written form. The lesson plan is simply the teacher's statement of the lesson objectives, the procedures and facilities to be used in presenting it, the specific goals to be attained, and the means to be used for evaluating the results achieved. Lesson plans will be described later in detail.

Explanation and Demonstration: Explanation and demonstration constitute the teacher's presentation of the knowledge and

skills which make up the lesson. Explanations must be clear, pertinent to the objectives of the lesson, and based on the known experiences and knowledge of the students.

Demonstrations should be presented to implement the explanations which introduce them. As little extraneous activity as possible should be included, and the students should understand clearly that the teacher is performing accurately the actions he has described. Any deviation in performance from that described which is caused by unanticipated circumstances should be acknowledged and explained immediately. Failure to do so may diminish student confidence in the teacher and what he is presenting.

Trial and Practice: Trial and practice constitute the student activity during the lesson. In classroom teaching, this may consist of recitation or solving problems. In farm shop or laboratory situations, it means trying for themselves the performance of the operation as explained and demonstrated, and practicing it until they achieve an understanding of the factors involved.

Fig. 24—Trial and practice in the field give students first-hand experiences in farming, an essential condition for effective learning.

Fig. 25— The teacher should make the demonstration to ensure correct emphasis on key learning points in the process under discussion.

Although technically they are separate segments of the lesson, portions of the teacher's explanation and demonstration activity usually are alternated with portions of student trial and practice activity. It is rare that the teacher completes his explanation and demonstrations, and then allows the students to accomplish their trial and practice activities without interruption for corrections and further demonstration.

Review and Evaluation: Review and evaluation are integral parts of each lesson. Before completion of the class period, the teacher should recapitulate what has been covered during the lesson, and require the students to demonstrate the extent to which they have met lesson objectives. The teacher's evaluation may be informal, and noted only for his use in planning the next lesson; or it may be recorded to show student progress in the course.

In either case, students should be aware of their progress and of advances and deficiencies noted at the conclusion of the

lesson. Failure of the teacher to make certain that students are cognizant of their progress, or their lack of it, may impose a barrier between them. Though it may be slight, it will make further teaching difficult.

If deficiencies or faults not associated with the present lesson are revealed, they should be noted carefully and pointed out to the students. Such corrective measures as are practicable within the limitations of the situation should be taken immediately, but more thorough remedial actions must be included in future lesson plans.

Evaluation of student performance and accomplishment during the lesson should be based upon objectives and goals established in the teacher's plan for that lesson.

Planning Teaching Activity

Any training activity, whether it be at kindergarten or college level, must be planned competently if it is to be effective. The principles governing the effectiveness of this planning are equally applicable to all types of teaching activity.

Determination of Overall Objectives: Before any important instruction can begin, objectives and standards must be determined. The general overall objective of vocational agriculture training is to qualify students to become competent, efficient, and knowledgeable farmers. The conscientious vocational agriculture teacher, however, establishes his own detailed objectives that will enable students to make correct decisions when confronted by all reasonable foreseeable agricultural situations.

An awareness of such objectives is necessary for any teacher who prepares and develops agricultural courses, as well as teachers who prepare effective plans for lessons that are part of these courses.

Identification of Blocks of Learning: It is not practicable for a teacher to proceed immediately toward overall objectives he

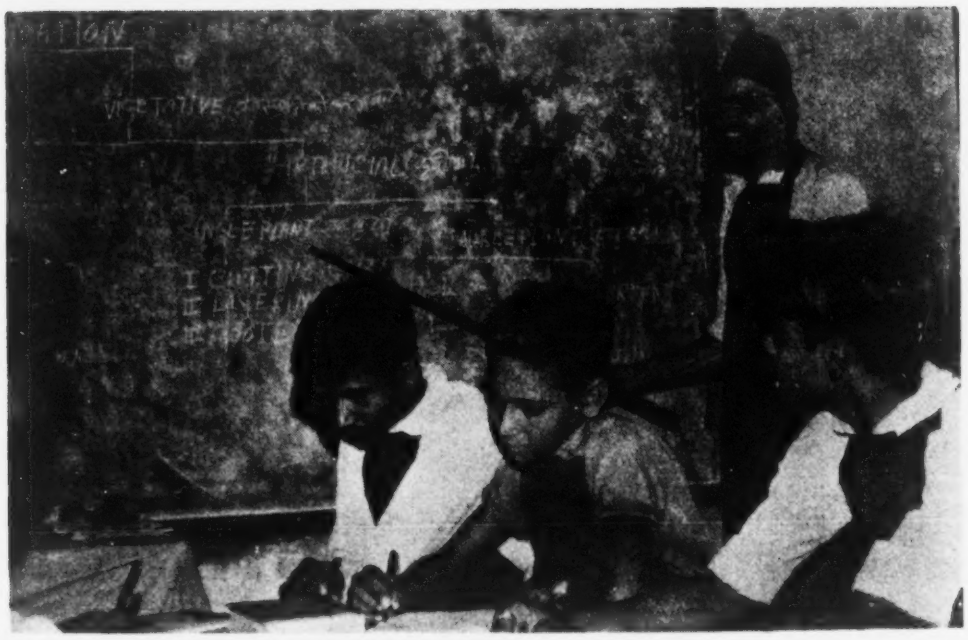

Fig. 26—Available in most classrooms, the chalkboard is the single most useful teaching tool. The effective teacher makes maximum and meaningful use of this valuable educational device.

has established for a major teaching activity he is undertaking. This requires development and assembly, in their proper relationship, of many "blocks" of learning. In this way, students can master segments of the overall requirement individually, and can progressively combine these with other related segments until their sum meets the final objectives.

Seen in this manner, the process is much like building a pyramid--each block is an identify in itself, but the pyramid is in complete if any one is missing. Both teacher and students must recognize the interrelationship of the blocks, and the place of each in the total objective of the lesson.

After overall objectives have been established, the next step is identification of blocks of learning that constitute the necessary parts of the total objective. Just as in building a pyramid, some blocks are submerged in the structure, never appearing on the surface; but each is an integral and necessary part of the structure. While identifying blocks of learning to be assembled during the proposed activity, the teacher must examine each carefully to see that it is truly an integral part of the structure. Extraneous

blocks of teaching are expensive frills, especially in agricultural teaching, and detract from, rather than assist in, completion of the final objective.

Blocks of learning identified during the planning of an activity should be propressively smaller in scope. They should represent units of learning that can be measured and evaluated--not a sequence of teaching periods.

There are infinite possibilities for breaking down and categorizing teaching objectives. For practical planning, the test of a useful size of a minimum block of learning is whether it contains sufficient material to:

1. Challenge the student.
2. Promise a reasonable return in accomplishment for the required effort.
3. Provide measurable objectives.

If it meets all these requirements, and is determined to be an integral, necessary part of the overall objectives of the program undertaken, it should be assigned a place in the course outline.

As the course progresses and these blocks of learning are completed, and student performance of each is confirmed at an acceptable level, related blocks will be combined to form larger segments of the total course objective. In this manner, use of a properly planned course outline makes it possible for the teacher to direct each period of instruction directly toward completion of blocks of learning, which are in turn combined with others to lead directly toward the overall objective.

The Course Outline is the backbone and framework of the curriculum. It consists of blocks of instruction to be completed in the most efficient sequence. It does not include the amount of instruction in the blocks, teaching procedures to be used, or standards for their completion. The vocational agriculture instructor may develop his own course outline after he has established his overall objectives, and has identified his blocks of learning.

Any practical course outline must be flexible, and should be used primarily as a guide. The sequence of blocks of learning can

and should be altered, when necessary, to suit student progress and the exigencies of special circumstances. In departing from the order prescribed by the course outline, however, it is the responsibility of the teacher to consider the relationships of the blocks of learning affected. It is often preferable to skip to a completely different part of the course outline when the conduct of a scheduled lesson is impossible, rather than proceeding to the next block, which may be predicated completely on skills to be developed during the lesson being postponed.

The Lesson Plan: Teaching is planned adequately only when the teacher has a lesson plan for each period of teaching. As seen from previous discussions, the lesson plan is the culmination and specific planning that must be the basis of all effective teaching. Teaching success depends more upon lesson planning than it does on presentation, personality, mechanical ability, or experience. Teaching is somewhat like a battle in that effort, strength and sincerity will not win if the strategy of its conduct is faulty. The finest workmanship and materials will not build a good farm implement if the basic design is faulty.

An experienced vocational agriculture teacher instinctively is able to construct an effective lesson plan for a routine period of teaching, or at least without committing it to writing. However, a teacher who has been through the course only a few times, or an experienced teacher who must modify his procedures to effect special emphasis, always should prepare a written lesson plan. This lesson plan may be very brief, topical in nature, and need not follow a prescribed format. It is prepared for the teacher's own benefit, and should be done in the form most useful to him.

The lesson plan may be more or less detailed, and may include special or associated considerations that should be covered during a class period. Every lesson plan must include at least the following items if it is to result in properly organized teaching:

1. Enterprise, Unit, Lesson Title: This should be a brief, clear statement for each heading to assist in identifying, filing, and recording lesson to be taught.

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2. Name, Class, Date: A space allotted to write in your name, the class to which the lesson was taught, and the date taught will be desirable for future reference.

3. Objectives: Objectives should be established in terms of what is to be learned by the student, skills to be developed, and performance expected at the end of the lesson.

4. Elements: A statement of the elements of knowledge and skills that will be necessary for fulfillment of lesson objectives. These may include elements previously learned and elements to be introduced during this lesson.

5. Schedule: The teacher should estimate the proportion of the lesson to be devoted to each element to be learned and the presentation and practice of each new operation. If available time does not allow adequate coverage, lesson objectives should be revised.

6. Tools & Equipment: A review of all equipment required for the lesson.

7. Materials and Supplies: The lesson may require expendable supplies for teacher and/or students. Size, kind, quantity, and quality of expendable supplies should be listed. This provides ready reference for future use of the lesson.

8. Motivation: The teacher must take the necessary action to motivate the students.

9. Teacher's Presentation: A determination of the teacher's responsibilities, and his proposed procedures for presenting the elements of knowledge and skills involved.

10. Student's Application: The anticipated and desired responses of the student to teaching, and a reasonable estimate of the practice or study needed to understand the elements involved.

11. Follow-up and Evaluation: The means and procedures proposed to evaluate learning and accomplishments of the students. These should include the standards of learning and proficiency expected.

The lesson plan should be carried by the teacher as a checklist, and he should study it until he is confident that he can not be diverted easily from this planned procedure. Once the lesson has begun, the teacher should not allow the application of his lesson plan to be diverted to other subjects and procedures. This does not mean that planned teaching should not be modified by circumstances, or by discovery of pertinent deficiencies in student knowledge essential to its effective completion. It is possible that the entire lesson may have to be agandoned in favor of a review of knowledge and skills previously covered.

To facilitate this, each lesson should begin with a brief review of elements covered during previous lessons, and any discussion necessary to bring student participation up to the proficiency assumed necessary for the start of the present lesson. If this review grows to unanticipated proportions, or necessitates abandonment or significant revision of the lesson plan, the teacher must be prepared mentally to construct a new lesson plan to guide the remainder of the lesson period.

The mechanics of constructing a lesson plan for each period of instruction may seem cumbersome. However, conscientious development and use of lesson plans is the most effective means of developing orderly and effective teaching habits. The procedure soon becomes habitual, and each segment falls into place for the experienced teacher with little effort on his part.

Figure 27 illustrates a desirable format of a lesson plan incorporating all essential items deserving a topic heading, and the meaning of each topic heading is defined. In an actual lesson plan, appropriate procedures should be filled in (see Figures 28 & 29). Additional completed lesson plans are shown later.

Enterprise:

Unit:

Lesson Plan:

Name: Class and Date taught:

A. Pre-class Activities

1. Objective:

2. Tools and Equipment:

3. Materials Needed:

4. Teaching Aids:

5. References: (a) Teacher: (b) Student:

6. Time Schedule:

B. Classroom Presentation Section

1. Preparation:

2. Presentation:

3. Application:

4. Follow-up:

C. Post-class Activities

1. Evaluation

   a. Procedure or Method used in teaching.

   b. Adoption of practices taught.

Fig. 27—Desirable format for a lesson plan, showing items deserving topic headings and the meaning of each topic heading.

ENTERPRISE: Horticulture UNIT: Cauliflower Production

LESSON NO. 10 TITLE: Harvesting and Processing Cauliflower

NAME:_____ CLASS:_____ DATE:_____

OBJECTIVES:	Develop understanding of: 1. Timeliness and methods of harvesting. 2. Necessary knowledge and skills in processing.
ELEMENTS:	Harvesting and processing skills.
TIME SCHEDULE:	45 minutes.
EQUIPMENT:	Sickle, basket, blackboard, chalk, eraser.
TEACHER'S PRESENTATION:	1. Explanation of timeliness in harvesting. 2. Methods and necessary skills of harvesting. 3. Explanation of skills involved in processing. 4. Demonstrations of harvesting and processing.
STUDENT'S APPLICATION:	1. Review of timeliness of harvesting. 2. Practice in harvesting as demonstrated. 3. Review of skill of processing. 4. Practice in processing as demonstrated.
FOLLOW-UP:	1. Oral questions. 2. Demonstration of knowledge and skill development during practice.

Fig. 28—A typical lesson plan.

ENTERPRISE: Farm Mechanics

UNIT TITLE: Care and Maintenance of Tools and Equipment

LESSON NO. 2 TITLE: Flattening and Sharpening the Spade

NAME: _____ CLASS: _____ DATE: _____

OBJECTIVES:	1. To develop on the part of the students maximum ability to understand flattening and sharpening the spade. 2. To develop optimum student performance in: a. Flattening the spade. b. Sharpening the spade.
ELEMENTS:	1. Heating. 2. Flattening with hammer. 3. Cooling. 4. Sharpening with file or stone
SCHEDULE:	135 minutes (three 45-minute periods).
TOOLS & EQUIPMENT:	1. Spade. 2. Hammer. 3. Heat (torch, forge, or open fire) and holding equipment. 4. Anvil. 5. File and/or stone.
MOTIVATION:	Discuss the need for properly fitted tools.
TEACHER'S PRESENTATION:	1. Preparation to discuss: Why spade should be heated, hammered, flattened, sharpened, cooled; results of poor workmanship. 2. Have blunt spade available. 3. Prepare heat. 4. Heat spade--show use of holding equipment (safety). 5. Hammer, cool, and file as needed.
STUDENT'S APPLICATION:	1. Each student required to: a. Bring a blunt spade to class. b. Heat, cool, and file as discussed and demonstrated by the teacher.
EVALUATION:	1. Supervise and examine individual performance. 2. Oral questions. 3. Follow-up.

Fig. 29—A typical lesson plan.

Maintaining Student Interest

The vocational agriculture teacher of Nepal is fortunate in having a subject to teach that has such importance and appeals to so many people. Probably the most challenging aspect of farming is its ever-changing technology and the conditions under which agricultural production takes place.

Learning how to profit from experiences of others is one thing that sets man apart from all other living beings. Plants and animals can make minor adaptations to their environment, or profit from their own experiences, but only man has developed ways of benefiting from the experiences of others. The process by which this occurs is called learning; arranging circumstances and facts so that related experiences are used profitably is called teaching.

Teaching can be effective and learning can proceed at an efficient rate only when people are truly interested in learning. All types of motivation may create, and sustain to a certain degree, an interest in learning. The most effective of these are the positive motivations. The strongest are those which promise pleasurable experiences, are novel and different, and challenge the student. Agricultural teaching can easily be presented in a way which supports these motivations perfectly. Student interest can be used to

Fig. 30—Live specimens brought into the classroom accomplish a dual purpose: they increase student interest while improving the lesson.

great advantage by the vocational agriculture teacher all through his teaching career by observing basic, well-known techniques of teaching.

Using the Student's Motivations: In his original analysis of the student, the teacher has attempted to determine what things interest him and what motivations have led him to take vocational agriculture. These motivations seldom are recognized by the student himself, and occasionally are concealed because of self-consciousness. The teacher should note carefully what interests the student, and to which motivations he shows the strongest reaction. While usually these are motivations the teacher originally has identified with the student, this may not always be the case.

The teacher must be careful not to project his own motivations or those he has observed in other students. Motivations vary, and while student response to motivations that work with others may seem genuine, they may not be effective in arousing and holding his interest. One student may derive satisfaction from experimenting in new areas, while others may be interested by assignments in proven technology.

When using the student's motivations to encourage him and to maintain his interest, the teacher must direct them in a positive manner, so that the teaching offered is furthered, not deterred or retarded.

The whole vocational agriculture teaching process actually is a transfer, from teacher to student, of the necessary functions of knowledge and skill in the farmer. If the student is made to recognize these functions as they are assigned to him, his interest will be maintained, and he will accept them eagerly as evidence of progress toward his final goal.

Using All of the Student's Senses: People learn through their perceptions. They display greater interest and learn more rapidly when information is gained through more than one sense. The student whose attention is called to all perceptions abailable to him in each lesson soon learns to examine his own sensory inputs with

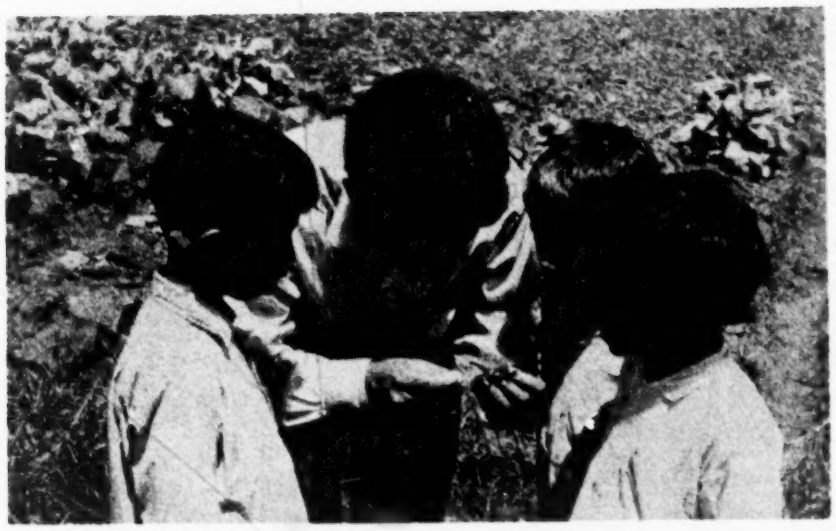

Fig. 31—Student motivation is stimulated and increased by a constant supply of current, living material. This instructor shows his students the effects of insect damage to a plant.

great benefit to his performance and rate of learning. He becomes an interested participant in all activities.

Contriving Experiences: Since people learn best from their own perceptions, the vocational agriculture teacher should contrive situations in which desired perceptions are likely to occur. These contrived situations need not be complicated, and never should be allowed to appear artificial to the student. They may consist of such simple procedures as allowing the student who has not managed his fertilizer or seed supplies properly to recognize his over-sight when he can not complete an assignment or project in time.

People who learn from actual experiences, contrived or not, are much more interested in the knowledge or skill attained, and benefit from the exercise in evaluating the situation for themselves. To assure maximum learning and retention, the teacher should create situations in which the same circumstances can be perceived in several different ways.

Knowledge and skills involved in agriculture are varied and often complex. Use of contrived situations to foster the exercise of all available channels of perception in presenting them to the student mind will emphasize important elements without boring the student or diminishing his interest.

Teaching From the Known to the Unknown: All learning proceeds from the known to the unknown. Descartes, the French philosopher, founded his whole cencept of man's knowledge on this simple premise: "I think, therefore I exist." From this simple assumption of one fact, he proceeded to others which he combined, developed, and refined to support everything we accept as truth today.

This, on a smaller scale, is exactly what each teacher must do in every field of teaching. Only the points of departure and the objectives are different. The teacher takes the experience and knowledge that the student brings with him, gives it meaning toward the subject he is to teach, and adds directed experiences, perceptions, and insights.

Perceptions are personal meanings within the individual, derived from his experiences. The teacher takes the student from where he finds him toward the objective he seeks. He arranges ideas to be learned and experience he provides so that the student constantly moves from the familiar to the unfamiliar, one step at a time.

This is the principle of the "building block" concept of learning, explained earlier. Each new experience should be made to isolate and identify one piece of the totality of agriculture. In like manner, each lesson also should help the student to tie a specific piece of learning to the overall task of learning to farm.

The teacher works in two ways at once. He segregates bits of learning from the overall goal so that students see precisely the effect of each small element. At the same time, he assists them in developing relationships of all other factors affected by this one small element.

Each new bit of learning must be experienced in many ways, and with many different associations to guarantee retention and understanding. Teaching that disregards what was learned yesterday leads to inadequate learning and wasted time. Accomplishing a new skill without recognizing and understanding previously learned elements involved results from poor teaching, and generates disinterest and forgetting. Each new lesson should present some new knowledge and skills; but each lesson also should require students to recall and apply previous learning.

Telling, showing, and in other ways presenting to a student an experience not based on or associated with things previously learned, will have little meaning to the student; and little learning will occur. To make certain this teaching is meaningful, the teacher must be sure that it is based on perceptions that are meaningful to the student because of his previous knowledge and experiences.

Emphasize the Positive: Almost everyone has his own "image" of agriculture. The vocational agriculture teacher exerts tremendous influence on the "student image" of agriculture. The way he conducts himself, develops his teaching, and builds his lesson plans will contribute to formation of a positive or negative impression by the students. The success of a vocational agriculture teacher depends in large measure on his ability so to frame his teaching that his students will develop a positive image of agriculture so important to a favorable learning situation.

Negative self-concepts inhibit the perceptual process; fear adversely affects the student's perception; threats limit an individual's ability to perceive; and negative motivations are less effective than positive motivations. A knowledge of those factors which have such a profound influence on the learner's ability to receive instruction is not enough. Teachers must keep a constant vigil to assure that these and other negativisms are not allowed to creep into their teaching procedures.

Most new vocational agriculture teachers tend to adopt those teaching methods used when they were students. Such methods may or may not have been good. The fact that one has learned under a given system of teaching does not mean that this is necessarily the best way it can be done, regardless of the respect he may retain for the ability of his former teacher. Some students learn in spite of their teachers, rather than because of them.

In his teaching, the most successful teacher will use positive explanations and motivations. Instead of emphasizing the dire consequences of an incorrect performance, he will cite the advantages of a correct one. Instead of berating the student for his errors, he will praise his correct performances. In this way, the student will be encouraged to seek out correct performance, rather than concentrating on avoiding forbidden errors.

The new vocational agriculture teacher has his choice of either positive or negative teaching. Throughout his carrer as a teacher, constantly and daily he will be tempted to use negativisms as tools of teaching. In making his choice, he should examine the record. Every reason and every experience points to the advantages of emphasizing the positive and minimizing the negative.

Evaluation

Evaluation is one of the basic steps in the teaching process described earlier. Evaluation of the student's learning is a continuing process. The teacher's evaluation may consist of simple observations of the student's rate of comprehension as evidenced by his performance or by administration of oral or written quizzes on pertinent knowledge.

Fig. 32—Requiring students to work in the field on the school farm is a positive teaching technique that produces good results in terms of efficient learning.

Oral Quizzing: Regular and continuous evaluation of the student's learning is necessary for judging the effectiveness of instruction, and for planning the emphasis and pace of subsequent teaching. The most practical means of evaluation for this purpose is direct or indirect questioning of the student by the teacher.

Proper quizzing by the teacher can have a number of desirable results:

1. It reveals the effectiveness of his own teaching procedures.

2. It checks the student's retention of what he has learned.

3. It reviews material already covered by the student.

4. It can be used to retain the student's interest and stimulate his thinking.

5. It emphasizes important points in the course or unit.

6. It identifies points needing more emphasis.

7. It checks the student's comprehension of what he has learned.

8. It promotes active student participation, which is important to effective teaching.

Effective quizzing requires preparation. Good questions rarely are spontaneous. Questions that are ambiguous, not clearly associated with the subject at hand, or do not solicit specific answers are of little value. They provide little information useful to the teacher, and they are confusing or frustrating to the student.

Asking "Do you understand?" or "Have you any questions?" has no place in effective quizzing. Assurance by the student that he does understand, or that he has no questions to propose provides no evidence of his comprehension, or that he even knows which subject is under discussion.

Other typical questions to be avoided are:

1. The puzzle: What action do you take if the feathers on six-weeks old chicks are "ragged" and dull in appearance?

2. The "tell all you know": What do you do before you plant rice?

3. The toss-up: Should you put 60 pounds or 61 pounds of ammonium sulfate on rice?

4. Bewilderment: In buying ammonium sulfate for rice (assume you need fertilizer since the soil has been tested showing a pH of 5.4, little phosphorus available, and little potassium available), and you have a little money, should you spend it all on ammonium sulfate, or should you spend it equally on calcium, phosphate, potash, and nitrogen?

"Catch" questions should be avoided at all times. Otherwise, the student soon will develop the feeling that he is engaged in a battle of wits with the teacher, and the whole significance of the subject of the teaching involved will be lost.

Irrelevant questions should be avoided. The teaching process must be an orderly procedure of building one block of learning upon another in orderly progression, until a desired goal is reached. Diversions, and the introduction of unrelated facts and thoughts will only obscure this orderly process and retard the student's progress. Answers to unrelated questions are not helpful in evaluating the student's knowledge of the subject at hand.

Leading questions are a waste of instructional time. A question which suggests its own answer is a much less efficient means of teaching than is a direct explanation. "Pumping" questions, which seek to extract an answer considered to be within the student's knowledge, are a waste of time. Answers that he is unable to recall would be of no use to him in an actual situation. If the question has

been stated clearly and presented properly, the student's failure to answer must be accepted as evidence that he would not respond correctly in the situation described.

The vocational agriculture teacher may use quizzing effectively in several ways. He may ask questions of the student, he may permit the student to ask questions, or he may present written questions for the student's consideration and answers. The principles of questioning, as described, apply to both oral and written quizzes by the instructor.

Answering student's questions also must conform to certain considerations if it is to be an effective teaching method. The instructor must be sure he understands a question before attempting to answer. He should display interest, by words and attitude, in the student's question, and frame as direct and accurate an answer as possible. After completing his response, the teacher must seek to determine that he has answered completely the student's request for information, and that the student is satisfied with the answer.

Sometimes it may be unwise to introduce the more complicated or advanced considerations necessary to answer completely a student's question. When this is the case, the teacher should explain carefully to the student that he has asked a good and pertinent question, but that the answer would, at this time, unnecessarily complicate the learning tasks at hand. The teacher should advise the student to reintroduce the question later at an appropriate point in the course, if it has not in the meantime been resolved in the normal course of the class.

Occasionally, a student asks a question that the instructor can not answer. In such cases, the instructor should admit freely that he does not know the answer. He should promise to get the answer, or if practicable, offer to help the student look it up in available references.

In all quizzing conducted as a portion of the teaching process, "yes" and "no" answers should be avoided. Questions must be framed so that the answers may be specific and factual, but one-word answers may well be the product of a good guess and not truly representative of the student's learning or ability. This ap-

plies to teacher answers to student questions, and to student answers to quizzes used in the teaching process.

Demonstrations of Ability: Demonstration of ability is a basic element of vocational agriculture teaching. Evaluation of demonstrated ability must be based upon established standards of performance, suitably modified to apply to the student's experience and stage of development as a farmer. To be meaningful to the teacher, evaluation must consider the student's mastery of the elements involved, rather than merely his overall performance.

Demonstrations of ability are important for exactly the same purposes as are quizzes. In evaluation, as in quizzing and other teaching processes, it is important to keep the student informed of his progress. This may be done as each procedure is completed, or during discussion periods.

Corrections or explanations of errors in performance should point out elements in which deficiencies are believed to have originated, and if possible, appropriate corrective measures should be suggested. Correction of the student's errors should not include the teacher's doing it for him.

Sometimes demonstrations will be performed correctly by a student who does not fully understand the principles involved and the objectives of the lesson. When this is suspected by the teacher, the student should be required to vary his performance slightly, combine it with other operations, or apply the same elements to the performance of other demonstrations. A student who does not understand the principles involved probably will not be able to do this successfully.

Examinations and Tests: The conduct of written examinations for students at regular intervals, or at stated points in the course outline, is valuable for evaluating the student's performance and understanding of the training provided, and his ability to accept and apply further training effectively. Such examinations must be simple and direct, all for specific answers, and be readily graded and evaluated by the teacher. Written exams should have direct application to the training given. Any tendency to cover material not taught by the teacher is ample evidence of poor teaching.

Chapter VI

SUPERVISED FARMING

Introduction

A fully developed vocational agriculture program provides the opportunity for each student to become responsible for one or more actual farm enterprises on his home-farm. For the beginning student, no more than one enterprise should be demanded by the vocational agriculture teacher. This single enterprise should be one in which the student is interested, and one he can initiate, conduct, and complete.

A good, beginning home - farm project might be selected from the following:

1. Production of one or more vegetable crops.
   a. Radish.
   b. Cauliflower.
   c. Red pepper.
   d. Tomato.
   e. Onion.
   f. Any other vegetable, or combination of vegetables, adaptable to the student's home-farm conditions.

2. Production of one or more cereal crops.

   a. Rice.
   b. Wheat.
   c. Corn

3. Production of one or more animals.

   a. Dairy cow.
   b. Sheep.
   c. Goat.

4. Poultry.

5. Others selected by the student and his vocational agriculture teacher.

As the student gains experience, confidence, maturity, and more agricultural technology, he should be encouraged to engage in more enterprises. By the time he completes his formal academic education, the overall goal should be for him to have had actual experiences in the successful production o. all the crops, livestock and livestock products that could be included profitably in the total farm business he plans to establish.

In order for that student to achieve these goals, the vocational agriculture teacher must provide individual instruction to him on the home - farm. No teacher should ever assume that the student and his father know what should be done. Adequate supervision by the teacher is essential in selecting, planning, and conducting each home project. This can not be done in the classroom alone. Therefore, many effective visits by the teacher to the homes of all students are necessary.

The primary purpose of the home visit by the vocational agriculture teacher is to give individual instruction in the one or more enterprises the student is working on. Other benefits enable the teacher to do a more effective job of teaching and, at the same time, produce invaluable learning experiences for the student:

1. The teacher can observe the home situation of the student. The teacher will be able to gain some insight into the problems and opportunities that confront the student. This will help the teacher to plan individual assistance as necessary on the home-farm, as well as in the classroom.

2. The teacher acn meet the parents. By gaining their confidence and support, he can build a better total program for school and community.

3. Through discussion with student and parents, observation of the home environment, and an on-the-spot

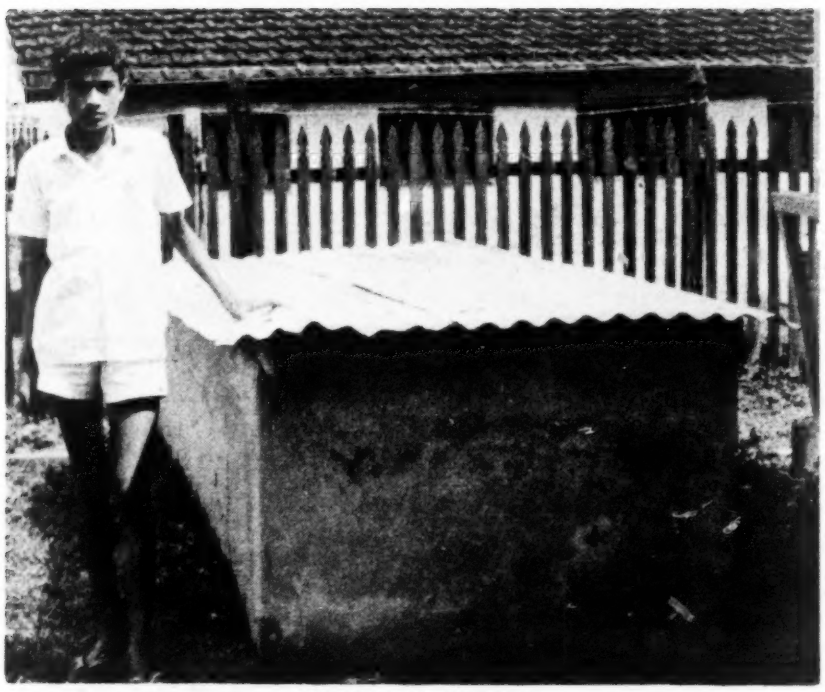

Fig. 33—An easily-constructed concrete silo provides a safe place for feed storage, offering protection from moisture and vermin.

Fig. 34—Storing hay on a raised platform keeps the fodder out of reach of the livestock, protects it from mud and moisture, yet permits easy access at feeding time.

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survey of the interests and resources available, he can help to plan constructively an attainable farm program for the student.

4. The teacher can observe the technology being used. From this, he can determine what he must stress to promote success for the student. The apparent needs also help in planning his classroom instruction, especially if he sees much the same situation on the home-farms of other students.

5. The teacher can teach both parent and student while discussing with them the total considerations necessary to make the chosen enterprise a success. At the same time, he will learn any weaknesses on the part of the student in his understanding of the knowledge he should have learned in the classroom.

6. The teacher can check the progress of the enterprise, offer suggestions for necessary changes, and encourage expansion of the program.

7. The teacher can motivate the student to greater efforts by:

   a. Showing, by the visit, that he is interested in the student.
   b. Discussing progress with the student and his father.
   c. Discussing with the student and his father what might be best for both of them in the future.

Farm Visits

When to Visit: There is no set rule that will serve for all students and parents. Generally speaking, the first visit should be made shortly after the teacher learns that a young man is to be a vocational agriculture student, or a prospective student. After a student has enrolled, the teacher should visit him as often as necessary in order to provide the necessary help and instruc-

tion to ensure success of the enterprise eventually selected by the student. More visits will be necessary for some students than for others, but experienced vocational agriculture teachers consider six visits per year the minimum. Regardless of the number of visits eventually made, enough should be made to:

1. Develop an understanding, on the part of both student and parents, of the total vocational agriculture program, and the importance of the supervised farming program.

2. Offer adequate assistance in helping select a farm enterprise that will be of value to him during his first year of vocational agriculture training. If possible, select on the basis of a long-range plan that will provide for expansion of the chosen enterprise, as well as addition of others.

3. Provide adequate assistance to the student in carrying out the chosen enterprise by using the technology necessary for most efficient production.

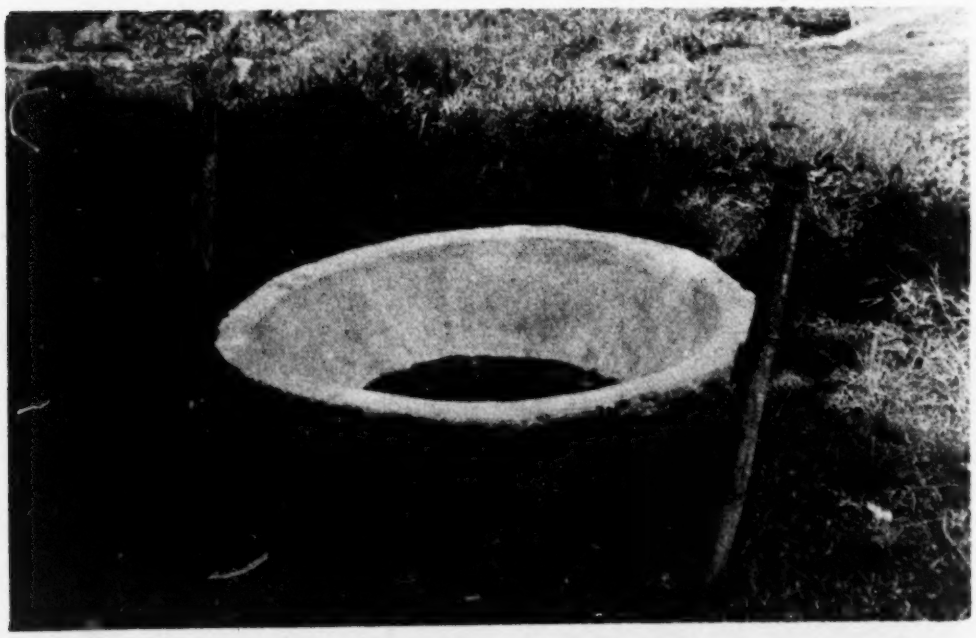

Fig. 35—A simple watering trough can be made easily from concrete by following this design. Size will be determined by needs.

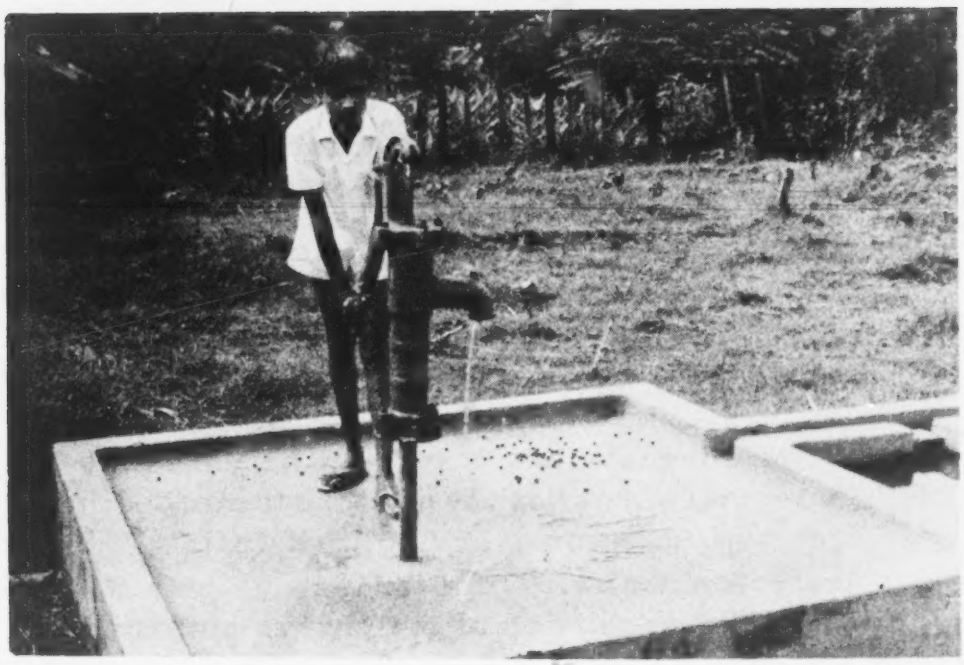

Fig. 36—A ready supply of fresh, clean water is essential. Concrete platform helps to prevent contamination of the well through surface drainage.

Fig. 37—The compost pit is a valuable device. It should be dug near the barn.

Vocational agriculture teachers must use some discretion as to when they visit the home-farm of the student. If a student, or his father, asks for help, the visit should be made immediately if they want help that soon. If it is a routine visit by the teacher to determine the progress of the student, the teacher should try to make it when it will cause the least inconvenience to the family. Routine visits should not be made during times when the family is heavily engaged in labor necessary to operate the farm. When possible, an appointment should be made. This will enable both student and teacher to arrange it at a convenient time. The student can arrange for an effective visit, and he will have no feeling that the teacher is trying to "spy" on him. The teacher may prepare by having equipment and supplies with him for the jobs in which the student has told him he might need help--ropes, castrating and docking tools, testing equipment, and the like.

Visitation Procedures:

1. Meet with the student, and if possible, his father. Observe the enterprise activities in which the student is engaged.

2. Teach whenever possible. If something is being done that is not correct, offer suggestions for improvement, telling why and how improvements should be made.

3. Discuss the future plans of, or for, the student.

4. Discuss agriculture with the father, any immediate plans or problems he may have, and his future plans.

5. Make a diary of the visit regarding the student's progress or deficiencies. This should be developed by the student, father, and teacher. Leave a copy with the student and his father. With dates, location of the farm, and time spent on the farm, the teacher can later make a report of his farm visitations to his headmaster or principal. Also, he can plan more effectively for his next visit to this student. If a prepared

form is preferred by any individual teacher, an example is shown on pages 000-000. This form may be modified according to the individual teacher's wishes.

6. Consider yourself a guest of the student and his family, but stay only as long as you are obviously welcome. and are accomplishing the purposes of the visit. If you are invited to have tea, accept the invitation.

Summary

Some of the greatest teaching and learning can be done on the home - farm. A visit by the vocational agriculture teacher can motivate the student and father to an extent not possible by any other method. This home-farm enterprise is an actual laboratory in "Learning by Doing," and the visit provides the vocational agriculture teacher an opportunity to supervise it. At the same time, the teacher can inspire, on the part of the parents, development of an ever-increasing appreciation of the value and need for vocational agriculture in the school system of Nepal.

TEACHER'S EVALUATION OF ON-THE-FARM VISITS

Student's Name: _____

Date: _____

Rating Scale
G = Good
A = Average
P = Poor

Criteria	Evaluation
To use this form properly, the teacher must honestly answer all of the following questions:	
Have I	
1. Conferred with the student prior to the visit?	G A P
2. Reviewed the student's home situation and farming program, and identified items that should be checked prior to the visit?	G A P
3. Made a definite appointment for the time of the visit?	G A P
4. Observed the student's total farming program?	G A P
5. Recorded information concerning the visit for future reference?	G A P
6. Noted progress made by the student since the last visit?	G A P
7. Discussed the student's farming program with at least one parent?	G A P
8. Discussed farm mechanics project possibilities or activities the student and his parent?	G A P
9. Assisted the student in developing a skill, such as docking or castrating?	G A P
10. Checked a project for efficiency, such as weighing feed and animals?	G A P
11. Discussed possible changes in, or additions to, student's farming program?	G A P
12. Discussed the student's program in vocational agriculture and school activities with his parents?	G A P
13. Developed a better understanding of the student and his home situation?	G A P
14. Checked for problems that night be used in classroom teaching?	G A P
15. Secured, or checked for, sources of teaching aids?	G A P
16. Checked on ways of assisting parents and young or adult farmers with farm problems?	G A P
17. Observed professional ethics at all times during the visit?	G A P
(Encircle the letter that best evaluates handling of each item)	

Overall Evaluation: G A P (Encircle one)

Additional Comment:

Note: Every farm visit, like any other teaching activity, should be evaluated -- either formally or informally -- by the teacher. Steps performed correctly must be repeated until they become habits. Steps handled incorrectly must be evaluated, and techniques improved until the farm visit is a regular and successful portion of the vocational agriculture teaching program.

Chapter VII

FUTURE FARMERS OF NEPAL

Introduction

A youth organization for the students of the vocational agriculture departments of the multipurpose high schools was initiated in the Spring of 1970. The organization was named "Future Farmers of Nepal." This name seems appropriate, since young men who complete the vocational agriculture program will surely be the next generation of farm owners and managers, agricultural technicians, and specialists for HMG. All of these jobs are critically dependent upon the agricultural industry for their future. This is truly a reciprocal agreement since the agricultural section of the economy is dependent on these young men to provide the practical and technical skills and knowledge needed to achieve the desired goals.

The role of the agriculturalist in the coming years will become more complex and demanding as Nepal's opportunities expand. The growth of a transportation and communication system will require new and different skills of the farmers. Knowledge of group action, rural leadership, public speaking, financial management, and marketing will be required for successful farm businesses.

The Future Farmers of Nepal can assist its members to meet these new demands by:

1. Providing leadership training to its members through office-holding and committee assignments.

2. Providing experiences in and an understanding of how a small group can work together for the benefit of all members.

3. Providing experiences in public speaking.

4. Providing a better understanding of farm management through the F. F. N's operation of a part or all of the school farm.

5. Providing experience and understanding of the management of budgets, accounts, and financial responsibility through joint management of the F. F. N.

6. Developing an appreciation and understanding of the role of leaders in the school, community, and national government by being involved in their own organization.

7. Developing a faith in one's self and in one's fellow agricultural workers.

8. Developing knowledge, skills, and desire to choose farming as a profession.

9. Providing encouragement for improve ment of farm life through home improvement.

Fig. 38—The advisor to the FFN increases his effectiveness when he maintains close contact with the office-bearers of the organization.

10. Providing members with knowledge and experience that will improve their character, strengthen their awareness of duty as citizens, and assist them in assuming leadership roles in Nepalesese agriculture.

These are desirable goals, and they can be achieved only as a result of considerable effort on the part of teachers and students. Much must be learned, including principles of parliamentary procedures, procedures for planning and implementing a program of work, and delegation of leadership responsibility, to mention only a few. The road ahead will be difficult at times, and evaluations and adjustments will be required.

Discouragements may be encountered, but all must remember that the agriculture wing of the multipurpose high school was selected to be first to implement the youth program concept. Every effort should be made to justify the faith in the youth and the Future Farmers of Nepal, as expressed by the people who made this possible.

On the following pages is reproduced the "Future Farmers of Nepal Manual," approved by the Multipurpose High School Section, Ministry of Education.

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FUTURE FARMERS OF NEPAL

MANUAL

Introduction

Agriculture, historically the basic occupation of the Nepalese people, constitutes the livelihood of nine out of ten citizens of Nepal today. Another five percent of the population are associated with agriculture—directly or indirectly. The importance of agriculture in the economic development of the nation, therefore, can not be overestimated.

Impact on the Culture

Being so important to the well-being of the society, agriculture has influenced every aspect of Nepalese culture. Important festivals, such as frog and serpent worship in the Kathmandu Valley, and the Dipawali festival—which have assumed a national character in Nepal -- are associated with the harvest as well as with the growth of crops.

Because irrigation is so difficult and is practiced in so few places, farmers invoke the Buddhist deity, Machhindra Nath, and the Hindu god, Indra, for abundant rainfall during the year. According to Hindu tradition, rainfall depends upon the number of marriages that take place in any year. (Thus, rain is considered an auspicious symbol when a marriage is undertaken.)

Impact on the Economy

In the past, the Nepalese people achieved remarkable progress in agriculture -- their chief source of income. Their genius is revealed in the wonderful terrace-cultivation seen in the hilly areas, and in the production of as many as five crops a year in some of

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the more fertile valleys. Thus, surpluses obtained from agriculture provided wealth and leisure for the people. These were utilized in developing the national culture which is seen today in the forms of temples, palaces, sculpture, art, and architecture. The cultural growth of the nation, begun in the Lichhavi period, reached its climax in the Malla period.

Impact on Religion

In the religion of the Nepalese people, great importance is given to the Earth, which is considered to be a female deity, the sustainer of all creatures of the world. Other chief gods, such as Indra, Varun, and Vishnu, also are intimately associated with rain and water, the primary needs of agriculture. In sacrifices, whether they be of the domestic or the grand type, offerings of rice grains mixed with butter and barley constitute an important part of the religion.

Social Structure

As the Nepalese society became more complex, division of labor was introduced. Those devoted to agriculture were called vayshyas. Among the Buddhist Newars, the tasks of agriculture were undertaken by jaffus (jyapus). This division of labor was very useful in the promotion of agriculture. According to Nepalese tradition, first priority is given to the profession of agriculture; second to trade and commerce, followed by other services. Thus, in Nepalese society of the past, much prestige and honor were given to agriculture.

Method of Agriculture

Methods of agriculture differed from place to place, but the basic principles remained constant. In the Kathmandu Valley, plowing was done by hand, using a space called the kodali. The use of hand labor arose from the fact that the size of land parcels belonging to individuals generally was very small, not exceeding five ropanies -- often even smaller.

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In the mountainous regions, land was plowed by means of oxen. In the Terai, both oxen and buffalo were used. Fertilizer was derived from:

a. Animal dung (cow, buffalo, goat, etc.)

b. Decayed leaves and plants.

c. Alluvial soil and special type of sub-soil, called "Kalimati", found in the Valley.

However, with the advent of modern times, due to an unbalanced growth of population partly promoted by advances in medical science, shortages appeared in agricultural production. In the West, this growth of population was balanced by the advance of science and technology in the field of agriculture, e.g., the use of chemical fertilizers, improved irrigation, better seeds, etc. In Nepal, however, the increase in population was not matched by new techniques and benefits from science in the field of agriculture. As a result, the Nepalese peasant experienced extreme poverty, misery, and starvation.

The peasant farmer knew nothing of scientific use of fertilizers, irrigation, or other improved methods of farming. Therefore, he continued to worship Machhindra Nath, Indra, and other gods for abundant rainfall and successful harvests. Past history indicates that the Gods were less merciful than expected. Frequent famines, therefore, were characteristic features of Nepalese agricultural economy.

The Revolution of 2007 (1950 A. D.) not only saw the transfer of power from the Prime Minister/Maharajah to the people, but also led to improvements in the field of agriculture. The Food and Agriculture Ministry was established and it assumed the important task of bringing improvements in agricultural production, thereby raising the standard of living of present-day Nepalese society. In a very short time, irrigation facilities were expanded, emphasis was placed on the use of chemical fertilizers, and improved varieties of seeds were imported. In addition, an agriculture school was established to train Nepalese farmers along scientific lines to become Junior Technical Assistants.

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In 2018 (1961 A. D.) Vocational agriculture was introduced at the school level, also to train Nepalese youths in this field. The future of agriculture in Nepal depends upon the success of this program.

Purpose of FFN

High school students who have specialized in vocational agriculture will be the model future farmers of Nepal. The responsibility of this group of youth will be immense. Their fundamental work will be to revolutionize traditional methods of agriculture in keeping with advances in science and technology.

Following are the principal objectives of FFN:

a. Having faith in their profession, to implement in the community at large the knowledge and training they received in school.

b. To convince the "traditional" farmers of the value of the new scientific methods -- by explanation and concrete practical example.

c. To check common plant diseases and other problems faced by local farmers.

d. To encourage the cultivation of new and improved varities of fruit trees, vegetables, flowers, poultry and animals.

e. To organize exhibits of local agricultural products and award prizes to the best and most sincere farmers.

f. To develop in themselves a cooperative attitude toward the social and economic welfare of the total environment.

Organization of Future Farmers of Nepal (FFN)

In keeping with the aims of the national agricultural scheme it will become necessary to coordinate the activities of future farmers thru some sort of organization in every school that offers agriculture as a vocational subject. It will be a purely educational organization having no function in any other sphere. It will be designed to develop agricultural leadership personal character, patriotic spirit, cooperation among students, and the habit of earning and saving something for the future. All this will enable them to become useful citizen of the nation.

Structure of the Organization

This organization shall consist of a Chairman, Vice-chairman, Secretary, Treasurer, and Members. Its success depends upon the faith of members in the organization and a feeling of cooperation and collective responsibility.

Fig. 39—Properly constructed and neatly lettered signs identify the work performed by vocational agriculture classes of the multipurpose school.

Composition

This organization shall consist of all students who have studied, or who are enrolled in, vocational agriculture.

Sessions

A mass meeting of the FFN shall be called at least twice each year -- once at the beginning of the major planting and again after reaping the harvest. The chairman may, in an emergency, summon a meeting at any time.

General Functions of the FFN

As a democratic organization, the FFN shall perform the following functions:

a. Elect officers (chairman, vice-chairman, secretary, treasurer) of the organization by a simple majority vote.

b. Run the cooperative farming activities of the school, using modern skills, science, and technology.

Control of the Executive

The general body shall keep constant watch over the activities of the executive by putting questions to the executive during sessions. It can also bring a vote of "no confidence" against the chairman, vice-chairman, secretary, or treasurer for misconduct. This requires a two-thirds majority of members present and voting.

Control of Finance

The general body shall pass on the annual budget of the FFN presented by the executive. This body may raise voluntary contributions or make loans, if necessary. It may use profits from land given to it by the school (which shall be at least two ropanies in Kathmandu or ten kathas in the Tarai).

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Term of Membership

Membership in FFN shall terminate when a student leaves school.

Disqualification

A member may be disqualified from participation in FFN if he or she:

a. Uses the organization for selfish motives.

b. Is unsound, physically or mentally.

All disputes concerning membership are decided by the chairman, the advisor, and the headmaster of the school.

The Executive

The Executive shall consist of a Chairman, Vice-chairman, Secretary, Treasurer, and five members representing each grade in the school (6th through 10th).

Election Procedure

Officers of the Executive shall be elected by the members of the organization. Students shall elect one member from each grade to the Executive.

Term of Office

Each officer and member of the Executive shall serve for one year. Elections shall take place before the end of each school session. Outgoing members shall, immediately upon close of the elections, hand over to the newly-elected members of the Executive, all documents appropriate to their offices.

Duties and Responsibilities of Office-Bearers

1. The Chairman:

   a. Presides over meetings of the Executive, according to democratic procedures.

   b. Keeps members of the Executive well informed of its activities.

   c. Calls special meetings of the Executive.

   d. Follows the activities of the Executive and evaluates its progress.

   e. Uses wisely and efficiently the funds allocated by the FFN.

   f. Supervises the work of cooperative farming.

   g. Keeps members well informed about the activities of the FFN.

   h. Calls the two General Meetings of the FFN.

   i. Calls Emergency Meetings of the FFN if he is convinced of the need for such meetings. In such cases, he shall consult the Advisor before calling the meeting.

2. The Vice-Chairman:

   a. Helps the Chairman in all his activities.

   b. In the absence of the Chairman, presides over meetings of the Executive.

   c. Is prepared to assume the duties and responsibilities of the Chairman, if required.

   d. In the absence of the Chairman, calls meetings of the Executive.

e. In the absence of the Chairman, discharges the responsibilities and duties of the Chairman.

3. The Secretary:

a. Prepares minutes of each meeting.

b. Attends to the correspondence of the Chairman.

c. Coordinates with the Treasurer in his activities.

d. Reads notices in meetings.

e. Submits reports of FFN to the mass assembly.

f. Checks the work of each member, and devotes himself to field work.

4. The Treasurer:

a. Prepares the annual budget of the FFN, under guidance by the Advisor.

b. Submits the annual budget of the FFN upon recommendation of the Executive.

c. Keeps the accounts of the cooperative farm; keeps in his custody and profits derived from the cooperative farm.

d. With approval of the Chairman and guidance by the Advisor, spends money required for operation of the FFN.

e. Cooperates with members in field work.

f. Conducts financial transactions under banking system with signatures of both Chairman and Treasurer.

5. Members:

a. Attend meetings of the FFN.

b. Fulfill the duties and responsibilities placed upon them.

c. Cooperate in the progress and development of FFN.

d. Take special interest in supervised farming and develop attitudes in this activity.

The advisor to the FFN shall be the Vocational Agriculture teacher of the school. His duties and responsibilities are set forth below:

a. To give general and technical advice to the FFN.

b. To instruct each member in cooperative farming, in keeping with modern methods of science and technology.

c. To award prizes and merit certificates to students who earn them.

d. To advise the Executive.

e. With the help of members of the FFN, to hold annual exhibits of the school's agricultural products.

f. To guide members of the FFN in generating an atmosphere favorable to the use of new and improved methods in the culture of poultry, vegetable and flower gardens, fruit trees, and livestock in each locality.

g. To always guide the FFN in the path of continued progress.

h. To prepare an "Agricultural Manual" School Bulletin with the assistance of other teachers and distribute it to all schools in Nepal.

Fig. 40—A Future Farmers of Nepal secretary.

Chapter VIII

YOUNG FARMERS OF NEPAL

Introduction

As has been mentioned many times before, Nepal is basically an agrarian society. The majority of the country's population earns its livelihood through the production of agricultural products—90-95 percent by some estimates. Due to the nature of the economy, only a limited number of the Nepalese people are able to complete their formal education. Of those who do, the attraction to other areas is strong, and only a few remain on the family farm. This combination of events provides only a small portion of farm operators who have had the benefit of training in agriculture.

In an effort to provide training for those who choose a career in agriculture, the Multipurpose High School Division of the Ministry of Education, HMG, has established the Young Farmers Training Program.

The term "Young Farmer" is meant to include those people who are currently attempting to become established in farming. Age is not a significant factor. Any person who is engaged in an agricultural production program to the extent that he has sufficient land to carry out the field exercise is eligible to be a member.

The manual for the Young Farmer Training Program, of which a copy is included in the next section of this chapter, will most likely require revision in the future to meet advances in technology and needs of local farmers. This can be achieved by an agriculture teacher's survey of community needs. As the program advances and the technological levels of the farmers rise, the curriculum will need revision. As a result, the curriculum outlined should be used as a guide and not be considered the only possible program.

The development of a sound operational Young Farmers Program can be one of a vocational agriculture teacher's most rewarding efforts. The program will also serve to develop a cooperative and supportive attitude among the farmers toward the total vocational agriculture program. Care must be taken and proper consideration given in the initial development of the program.

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YOUNG FARMER TRAINING PROGRAM

What It Is

The Young Farmer Training Program is a special effort to stimulate Nepalese farm boys to take up scientific and profitable agricultural enterprises in the future. This is a program for young farm boys to learn through the help of an expert and experienced teacher in the classroom as well as to help them to help themselves on their own farms.

Purpose

It has been well observed that rural youths, after little or adequate education, want to take government jobs rather than work on their own farms. Even agriculturally trained young men are attracted to jobs other than farming. This is one of the main reasons that HM, the King, called for the "Back to the Village Program. "One of the main purposes of this program is to make farm boys understand the value of agriculture and the dignity of labor.

Vast numbers of Nepalese farm boys do not go to school. Many of those who do, drop out during primary or secondary school. As a result, they have little knowledge, skill, or ability that will contribute to making a livelihood for themselves. Therefore, this program is aimed at giving a helping hand to such young men — a guide to profitable farming.

Objectives

1. To help farm boys to understand the value of agriculture and to realize the dignity of labor.
2. To help them acquire maximum skills in various agricultural projects.

Original written in Nepali by Madan Prasad Adhikari, Vocational Agriculture Inspector, Tri - Juddha MPHS, Birgunj. Consulting Committee: S. M. Joshi, Acting Deputy Director of MPHS, Vocational Education Section; Dr. Thomas R. Stitt, Agriculture Advisor, Southern Illinois University Contract Team, US AID/Nepal.

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3. To help them to acquire basic knowledge in training and to adapt this knowledge to their home-farms.

4. To help them to evaluate their own performance.

5. To help them to prepare and select an appropriate job on the farm.

Secondary Objectives

1. To develop students' ability to cope with their problems and improve their lot in life through improved agricultural endeavor.

2. To improve the proficiency of young farmers in the community through a practical and applied approach to their farm problems.

3. To improve the proficiency of young farmers in their communities by accepting social responsibilities in the community and nation.

4. To instill in the rural youth of Nepal the necessary leadership qualities.

5. To help them earn something during training with a small investment and to convince their parents or guardians to later initiate it on a larger scale.

6. To help solve the community's need for daily agriculture commodities. and to show them how they can serve.

7. To help the students to understand:

"Learning to do,
Doing to earn,
Earning to live,
Living to serve."

Criteria for Selection of Training Places

1. Young Farmer training programs must be conducted in schools or similar institutions.

2. A rural area is preferred.

3. There must be room enough for 20 students per class.

4. The school or institution must have at least one-half acre of agricultural land within its compound, with irrigation facilities.

5. The place must not be too far from the local Multipurpose High School if the program is not offered or conducted at the Multipurpose School.

6. It must be recommended by the District Panchayat.

Criteria for Selection of Candidates

1. Candidates must be literate.

2. Candidates who have some secondary education but could not finish for any reason, and are presently considering going into farming, are preferred.

3. Candidates must have a home garden or field of their own.

4. Candidates must have a keen desire to take up agriculture as their profession.

Nature of Training and Formal Procedures

1. This is a special program meant to help farm boys select the right kind of job and bring efficiency to their performance.

2. There will be two semesters in this training program.

3. During the busiest farming period, training will not be offered, primarily during rice cultivation and harvesting periods.

4. Training will be mostly practical in nature with a little, at the most, essential academic or technological information.

5. This is a helping program for the farm boys themselves. Therefore, the financial burden, other than the allowance for the teacher and transportation of equipment, must be borne by the candidates.

6. Expenses required for individual projects must be assumed by the candidates conducting the projects.

7. Some necessary equipment will be supplied by the Multipurpose High School for a short time.

8. Multipurpose high school vocational agriculture teachers will be employed in this program to teach the young farmers.

9. Classes will meet once a week; but if candidates think it beneficial, and make a formal request for a twice- or thrice-a-week program, their request will be honored. However, the final decision will come from the teacher.

10. No stipend or other extras will be given the students.

11. Classes will meet either in the morning or in the evening, at the convenience of teacher and students.

12. Different kinds of information necessary for agricultural enterprises will be supplied. Specialists such as DADO's, local JTA's, representatives of agricultural supply corporations, cooperative banks, and other similar agencies will be invited to meet with the class and help the young farmers solve their economic problems, and help them by all possible means.

13. This training is mobile in nature. Therefore, any village or community willing to have this program must apply through the Village Panchayat, with the recommendation of the District Panchayat. The final decision whether or not the program requested should be offered will be in the hands of the Secondary Education Department of HMG.

Usefulness of Training to the Community

Evaluation of the training will be done by participating students who complete the training. It is hoped that this program will definitely help solve some of the food and unemployment problems in a positive manner. The usefulness of this training reses on the inspiration, encouragement, and proper guidance that is given to the young farmers.

Subject Matter of Study

A brief knowledge of soil and its structure, texture, silt, and clay; their characteristics in holding water; and plant nutrients will be taught practically in the field with the help of the following questions:

1. Where does the plant grow?
2. Why does it not grow in the pile, sand, water deposits, or the air?
3. What are the requirements for a plant to germinate?
4. What are the requirements for a plant to grow and bear fruit?
5. Why don't farmers cultivate rice in sand?
6. Why is it that nobody cultivates potatoes or ginger in the clayey soils?
7. Which is the best kind of soil for a farmer?

8. How would you recognize the kind and quality of a sample of soil?

9. How would you take a sample of soil?

Soil Conservation: Its Importance and Methods

Soil contains food nutrients for plants. If the nutrients are too far below the surface, the roots of the plants cannot take them in. Nutrients sometimes are washed away by rains and floods. Excessive exposure to the sun also decreases plant nutrients in the soil. Water over the surface for an excessive period of time spoils soil quality.

1. Why is water in the street during the rainy season?

2. Why do farmers keep a ridge (aali) around their fields?

3. Does the aali (ridge) have agricultural importance other than for boundary purposes?

4. Why do farmers plant potatoes and pepper in beds?

5. Why is making beds for cultivation so much more prevalent in the Kathmandu Valley than in other places?

6. Why do people keep green turf over the surface of new soil fills?

7. Why are the following statements true:

   a. Your field goes deeper every year.

   b. Your field is elevated every year.

   c. The Tundikhel or other grazing lands remain constant.

Moisture Conservation

Soil holds water. The main source of water is rain. However, rain water cannot remain in the same quantity in the soil all time.

1. Why? Where does it go?
2. Why do your wet clothes dry sooner in the months of Chaitra and Baishakha (April and May) than in Bhadra and Aswin (July and August)?
3. Does pea or any other grain germinate in dry sand?
4. How could you help germinate the seed?
5. Why does your field crack during the last months of the year (Chaitra and Baishakha)?
6. Why do farmers spread husk and straw in their cultivated fields during the hot season?
7. Why do farmers sow grass during the off-seasons?
8. Why do farmers till their land before the monsoon season?
9. What is mulching?
10. What could be other benefits of mulching other than conserving moisture?

Irrigation and Drainage

Water is the life of all natural vegetation. Without water, nothing can germinate or grow. Plants get nutrients through water. The soil gets water from rain. We can also make water available to plants through:

1. Rivers 2. Wells. 3. Lakes. 4. Tanks.

Water from these four sources may be taken away through canals. The underground water, tank water, and well water first is lifted by pumps, machines, or other mechanical devices.

1. How does deep water come under the ground in your area?

2. How do farmers take up water for irrigation?

3. How many kinds of water-lifting devices have you seen?

4. How do you irrigate your rice field?

5. How do you irrigate your potato or wheat fields?

6. Do you pour water directly over your plants?

7. What is the proper way to irrigate your vegetable field?

8. Have you seen this method?

9. Have you ever tried or seen pre-irrigation (irrigation before planting)?

10. What could be some possible benefits?

Excess of anything is bad. Too much water in the field is bad. It spoils the character and quality of the soil. Therefore, precautions must be taken against the possibility of excess rain water and floods. There must be an outlet for excess water from your field.

1. How would you maintain a seedbed during the monsoon or Ashadh season?

2. How would you plant vegetables in Aswin or Bhadra (August or September)?

Manure — Fertilizer

All living things need food to survive and to grow. They need special foods for extra energy. Similarly, plants also need food to survive, as well as for growth and for extra energy. They get their food from the soil. The plant foods (nutrients) of greatest concern in Nepal, as well as in most of the world at present, are:

1. Nitrogen 2. Phosphorus. 3. Potassium.

When we plant and harvest the same kind of crop every year, plant nutrients become exhausted. The farmer needs to give them manure to supply nitrogen, phosphorus, and potassium, as well as to adopt the practice of rotating crops. Manures are of two types:

1. Farm manures.

2. Chemical fertilizers.

Manure that comes from animals, animal products, and vegetation is farm manure. Chemical fertilizers are prepared in large manufacturing plants. Farm manure supplies everything needed by the plant, but chemical fertilizers supply only the nutrients purchased. Chemical fertilizers are excellent, but they are expensive. However, this expense can be justified if yields and profits are increased.

The functions of farm manure, nitrogen, phosphorus, and potassium are:

1. Helping promote growtn.

2. Keeping the leaf green.

3. Enriching the quality of the crop.

4. Increasing yields. (When applied efficiently and correctly, profits will increase.)

The sources of farm manure, nitrogen, phosphorus, and potassium are:

1. Animals.

2. Compost.

3. Chemical fertilizers.

Chapter IX

COURSE OF STUDY
IN
VOCATIONAL AGRICULTURE
FOR S L C

His Majesty's Government
Ministry of Education, Department of Education
Secondary Multipurpose Education Division

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S. L. C. EXAMINATION

V O C A T I O N A L A G R I C U L T U R E

Distribution of Marks

Paper I - Theory Time: 3 Hours			Marks - 70
A. Climatology, soil, manure, & fertilizers		20	
B. Horticulture		25	
C. Agronomy		25	
Practical Time: 3 Hours			Marks - 30
Practical work			Total 100
1. Horticulture & Agronomy	20		
2. Internal Assessment	10		
Paper II - Theory Time: 3 Hours			Marks - 70
A. Animal Husbandry		30	
1. Dairy cow keeping	20		
2. Buffalo keeping	10		
B. Goat or sheep or swine keeping		10	
C. Poultry keeping		30	
Practical Time: 3 Hours			Marks - 30
Practical work			Total 100
1. Animal & Poultry Husbandry		20	
2. Internal Assessment		10	

B. B. Pass mark in each paper is 36

AIMS AND OBJECTIVES OF VOCATIONAL AGRICULTURE

Agriculture is one of the major vocations taught in the Multipurpose Schools from the 6th to 10th grades. The educational philosophy in teaching Vocational Agriculture in these schools has been defined as follows:

1. To fit the students for useful employment.
2. To meet the needs of students who wish to work on the farm.
3. To prepare students to meet with growing efficiency the needs of a progressive vocation of farming.
4. To produce agricultural products efficiently.
5. To market agricultural products commercially.
6. To select and use suitable farm equipment and supplies.
7. To co-operate intelligently in economic activities.
8. To manage farm business effectively.
9. To maintain a satisfactory farm home.
10. To perform appropriate and economic farm mechanics activities.
11. To participate in worthy rural social activities.
12. To use scientific knowledge and procedures in a farming occupation.
13. To exercise constructive leadership.
14. To grow vocationally.
15. To become successfully established in farming.

S. L. C. Vocational Agriculture

CURRICULUM

UNIT I

PAPER I

I. ORIENTATION

A. Vocational Agriculture in high schools.
B. Service rendered by farmers to human society.
C. Role of a farmer in Nepalese society.
D. Information on various agriculture developmental works in Nepal and the world.
E. Opportunities in agriculture in Nepal.
F. Different agencies which help farmers.

SUGGESTED ACTIVITIES

1. Students' guardian gathering once a year.
2. Local farmers' and students' conference once a year.
3. School and community agricultural survey dealing with local farm problem.
4. Speeches by concerned personalities.

The arrangement of the above suggested activities is the entire responsibility of the Vocational Agriculture teacher. An evaluation copy of the conferences and community survey report must be sent to the Secondary Education Division and another must be kept for the student's personal file. The personal file of the student must be checked by the teacher and submitted to him at the end of the school session.

II. AGRO. CLIMATOLOGY

A. Position, physical, and zonal division of Nepal.
B. The climate and the people.
C. The agricultural products of Nepal.

SUGGESTED ACTIVITIES

1. Keeping daily records of temperature, rainfall, and wind.
2. Taking Mean Temperature and calculating relative humidity.
3. Taking field trips to different regions of Nepal, if possible.

III. SOIL SCIENCE

A. Soil and soil formation.
B. Soil composition and soil constituents.
C. Soil structure and texture.
D. Kinds of soil, with special reference to Nepal.
E. Maintaining soil fertility, soil organisms, rotation of crops.
F. Soil erosion and soil conservation.
G. Soil PH and its value to farmers.
H. Tilling field and preparing soil for vegetables, cereals, fruits, etc.
I. Developing a nursery for vegetables, cereals, flowers, and fruits.

SUGGESTED ACTIVITIES

1. Taking field trip to show soil erosion and soil conservation.
2. Conducting PH test and soil texture analysis test.
3. Preparing field for different crops.
4. Operation and maintenance of kodali, cultivators, hoes, rakes, and other tilling equipment.
5. Soil sample collection.

IV. SOIL WATER

A. Water requirements of plants (including wilting point, osmosis).
B. Water retention of the soil:
   1. Gravitational water
   2. Capillary water
   3. Hygroscopic water
   4. Surface water

C. Irrigating vegetables, agronomy and fruit crops.
D. Drainage, its necessity, mode and methods, etc.
E. Conservation of moisture.

SUGGESTED ACTIVITIES

1. Practicing water methods for vegetables and flowers.
2. Providing drainage in individual plots.
3. Adopting moisture conservation practices.
4. Conducting osmosis and soil water tests.

V. MANURE & FERTILIZERS

A. Kinds of Manure

   1. Organic
   2. Inorganic

B. Organic manures, their values and advantages.

1. Farmyard manure and how to make it.
2. Compost manure and how to make it.
3. Other manures, including poultry manure, and how to make them.
4. Oil cake and how to use it effectively and economically.
5. Green manure and how to use it.
6. Other sources of manures as bone meal and fish meal.

C. Inorganic manures, their sources and functions.

1. Nitrogenous
2. Phosphatic
3. Potassic

D. The right way to use manures, i.e., method, time, and quantity of application.

SUGGESTED ACTIVITIES

1. Identifying inorganic and organic manures by simple observation.
2. Preparing different organic manures in pits.
3. Applying both organic and inorganic manures to different crops and calculating the return.
4. Calculating the amount of manure applied and the return in terms of monetary value.

VI. PLANT DISEASES AND PESTS AND THEIR CONTROL

A. Kinds of plant diseases, with special reference to olericulture, floriculture, and crops prescribed for the S.L.C. course.
   1. Plant nutrient deficiencies.
   2. Virus, fungus, mosaic, bacteria, and monatodes.
   3. Harmful insects and pests.

B. Methods to control them.

SUGGESTED ACTIVITIES

1. Collecting and identifying diseased plants and making an album of them.
2. Collecting vegetable or cereal or fruit crop pests.
3. Operating and maintaining sprayers and dusters.
4. Collecting and identifying harmful local weeds of different crops and making an album of them.

N.B. At least one or more of the above listed collections should be submitted to the concerned teacher.

UNIT II

I. CROP PRODUCTION

A. Olericulture
1. Value of vegetables in human nutrition.
2. Opportunities in vegetable production.
3. Cultivation and cultural operation of any four of the following vegetable crops:

a. Tomato
b. Cauliflower
c. Radish
d. Okra
e. Eggplant
f. Garden pea

Spices - (any two of the following):

a. Onion
b. Ginger
c. Turmeric
d. Chillies or capsicum

Greens (any two of the following):

a. Mustard
b. Spinach
c. Cress

SUGGESTED ACTIVITIES

1. A detailed working plan and result sheet of four winter and summer vegetables should be submitted to the concerned teacher.
2. A record of growth and cultural practices adopted.

B. Fruit Production

1. Plant propagation (with reference to budding, grafting, cutting, and enarching).
2. Cultivation and cultural operation of at least three of the following fruits:

a. Pome family (pear or apple)
b. Citrus (lemon or orange)
c. Mango
d. Banana
e. Papaya
f. Pineapple

SUGGESTED ACTIVITIES

1. Acquiring skill in cutting, budding, grafting, enarching, pruning, etc.
2. Practicing manuring and irrigation in fruit plants.
3. Preserving any one of the budding, grafting, or cutting projects for S.L.C. final.
4. Submitting a detailed plan of the orchard to the concerned teacher.

C. Gardening, using local, seasonal, and perennial flowers in pots and beds.

D. Landscaping and using grass.

E. Plantation of ornamental plants and herbs.

SUGGESTED ACTIVITY

Submitting a detailed plan of landscaping with grass, herbs, and ornamental plants.

F. Agronomy

Cultivation and cultural practices of at least two cereals, two pulses, one oil crop, and one special crop necessary according to local and regional conditions.

1. Cereals -- rice, wheat, maize.
2. Pulses and leguminous crops -- pea, arhar, mash, mung, and alfalfa.
3. Oil crops -- mustard, sesame, and linseed.
4. Special crops -- jute, tobacco, potato, tea, and sugar cane.

SUGGESTED ACTIVITIES

1. Developing a plan of what and when to plant.
2. Treating seed.
3. Trying out various methods of germination seed test.
4. Keeping records of growth and cultural practices adopted.

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UNIT I

PAPER II

ANIMAL HUSBANDRY

I. INSTRODUCTION

A. Definition of the term 'Animal Husbandry'.

B. Importance of animal husbandry in Nepal.
   1. Animal husbandry in Nepalese economy.
   2. Animals as providers of high class human food (meat, milk, eggs).
   3. Animals as providers of clothing (wool, skin, feathers, etc.).
   4. Animals as providers of power for work.
   5. Animals as users of roughage.

C. Prospects and future of animal husbandry enterprises in Nepal.
   1. Livestock:
      a. Cows and Buffaloes, with special reference to local breed, Murrah, Neli, Jaffarabadi, and Terai buffaloes.
      b. Goat or sheep or swine.

   2. Poultry:
      With special reference to chickens and elementary knowledge of duck farming.

SUGGESTED ACTIVITIES

1. Field trip to local livestock and poultry farms.
2. Making a list of various animal products in terms of monetary value.

II. DAIRY FARMING

A. Introduction to dairy farming.
B. Advantages of dairy farming.
C. Selection of breed.
   1. Nepali
   2. Indian breeds with reference to Sindhi, Hariana, and Sahiwal.
   3. European breeds, with reference to Jersey, Brown Swiss, Holstein, Ayreshire, and Gurnsey.

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III. HOUSING FOR DAIRY CATTLE

A. Selection of site
B. Barns for different classes or breeds of cattle
C. Types of barns
D. Stall design
E. Calving boxes
F. Sheds for calves
G. Bull shed

IV. STUDY OF THE DIFFERENT PARTS OF THE DAIRY COW AND DIGESTIVE SYSTEM

SUGGESTED ACTIVITY

1. Drawing the digestive tract and different organs with the view of recognising them along with their functions.

V. ANIMAL NUTRITION

A. Food for animals
   1. Water
   2. Protein
   3. Carbohydrate
   4. Fat
   5. Vitamins
   6. Minerals

B. Function of nutrition in animal body
C. Sources of nutrients
D. Ration for livestock
E. Ration for growing calf
F. Ration for a milking cow
G. Ration for a breeding shire
H. Ration for a breeding cow
I. Principles and methods of feeding animals

SUGGESTED ACTIVITIES

1. Making a list of local available livestock ration ingredients and calculating according to given formula.
2. Feeding and watering of dairy livestock.
3. Calculating the cost of a pound of a particular ration.

VI. FORAGE

A. Legume forage
B. Hay
C. Pasture management
D. Silage

SUGGESTED ACTIVITIES

1. Growing legume grasses and fodder crops
2. Making hay
3. Making silage and silo pit

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VII. BREEDING AND SELECTION

A. Transmittal of characteristics from parents to offspring.
B. The system of breeding with reference to:
   1. Inbreeding
   2. Outbreeding
   3. Cross-breeding
   4. Upgrading

C. Improving the productivity of local animals.
D. Artificial Insemination:
   1. Definition
   2. Advantages and disadvantages
   3. The overall process
   4. System of mating
   5. The heat period
   6. Development of foetus
   7. Care of a pregnant cow
   8. Care and maintenance of a calf.
   9. Dehorning
   10. Castration

SUGGESTED ACTIVITIES

1. Identification of the color, skin, horn pattern, and confirmation of important breeds and identification of offspring using listed points or criteria.
2. Field trip to local A.E. Center.
3. Observation of sperm through microscope.

VIII. ANIMAL HEALTH

A. Relation between health and production.
B. Definition of disease.
C. Causes, symptoms, and control measures of important diseases as:
   1. Foot & Mouth
   2. Anthrax
   3. Tuberculosis
   4. Brucellosis
   5. Mastitis
   6. Rinderpest
   7. Ketosis
   8. Bloat
   9. Milk fever
   10. Poisonous herbs
   11. Internal and external parasites

SUGGESTED ACTIVITIES

1. Field trip to veterinary hospital.
2. Speeches by veterinary experts.
3. Taking body temperature (rectal), counting pulse and respiration rates, and developing charts for submission.
4. Drenching medicine.
5. Injecting drugs.
6. Disenfecting animal sheds.
7. Brushing.
8. Observing bacteria through microscope.

IX. DAIRYING

A. Milking cow
B. Milk and its properties
C. Selling milk
D. Making of the following milk products:
   1. Khuwa
   2. Butter
   3. Ghee
   4. Curd

X. MANAGEMENT OF BUFFALO WITH REFERENCE TO:

A. Local breed
B. Murrah
C. Jaffrabadi
D. Nili
E. Terai breed

XI. GOAT KEEPING FOR MILK AND MEAT WITH REFERENCE TO:

A. Barbari
B. Betal
C. Jamuna pari
D. Kashmeri
E. Sanan

1. Housing Management
2. Feeding Management
3. Castration
4. Fattening

OR

SELECTION OF SHEEP FOR SPECIAL PURPOSES,
i.e., WOOL AND MEAT

A. Local varieties of sheep as Kaage, Rabu, Tibetan, and Baruwal. Improved varieties as Bekanari, Kashmeri, Marino, Rambouillet, Dorset, Lincoln, and Hampshire.
B. Breeding, feeding, fattening, shearing, dipping, and docking.
C. Diseases and their control with special reference to:
   (a) Foot rot, (b) Mouth rot, and (c) Liver fluke.

OR

XII. SWINE KEEPING

A. Improved varieties as Yorkshire, Hampshire, Chester White, Landrace, and Tomberg.
B. Breeding, feeding, fattening, housing, and castration.
C. Diseases and their control with special reference to:
   (a) Skin diseases, (b) Cholera, (c) Pox, (d) Crysipelas, (e) Foot and mouth disease.

UNIT II

POULTRY MANAGEMENT

I. INTRODUCTION TO POULTRY MANAGEMENT

A. Origin
B. Advantages
C. Importance

II. OPPORTUNITIES IN POULTRY KEEPING IN NEPAL

III. CLASS, BREED, TYPE, AND VARIETY

A. American class
B. Mediterranian class
C. English class
D. Asiatic class

IV. SELECTION OF BREEDS FOR EGG PRODUCTION, MEAT PRODUCTION, AND DUAL PURPOSES

V. ANATOMY AND PHYSIOLOGY OF THE CHICKEN

A. External parts of a cock and a hen.
B. Brief study of the digestive, respiratory, circulatory, and reproductive systems.

SUGGESTED ACTIVITIES

1. Identifying the external parts of the chicken, and with its help identify different breeds and varieties.
2. Taking field trips to local poultry enterprises.
3. Autopsy of a cock and a hen to study different anatomical systems.

VI. PRINCIPLES OF BREEDING

A. Elementary knowledge of mating and systems of breeding.

VII. INCUBATION AND HATCHING MANAGEMENT

A. Principles of hatching.
   Selection of hatching eggs.
B. Methods of Incubation:
   Natural incubation
   Artifical incubation.
C. Kinds, operation, maintenance, and simple repair of incubators.

VIII. BREEDING CHICKS

A. Principles of breeding and rearing
B. Artificial breeding
C. Kinds of brooders
D. Requirements of a brooder house
E. Operation, maintenance and simple repair of kerosene brooders
F. Preparation of brooder house

SUGGESTED ACTIVITIES

1. Acquiring knowledge of the various parts of a brooder
2. Calculating the space requirement for a brooder house
3. Making a brooder guard or ring
4. Bedding the litter
5. Feeding, watering, and handling of chicks

IX. RAISING PULLETS, BROILERS, AND LAYERS

X. FEEDS AND FEEDING

A. Feeding principles and practices
B. Poultry nutrition requirements:
   1. Energy
   2. Protein
   3. Fat
   4. Vitamins
   5. Minerals, etc.

C. Poultry feed ingredients
D. Ration for chicks, growers, broilers, and layers
E. Feeding techniques

SUGGESTED ACTIVITIES

1. Preparing rations for different ages of birds out of local materials.
2. Weighing birds every week, calculating ration used, and evaluating the efficiency as well as feed conversion.

XI. HOUSING AND EQUIPMENT

A. Poultry houses: types and essential materials
B. Factors to be considered in construction:
   1. Economic
   2. Physical
C. Types of poultry farming:
   1. Intensive
   2. Semi-intensive
   3. Extensive
D. Essential poultry equipment: (a) feeders for chicks, growers, and adult birds; (b) watering pan or fountain, (c) roosts, (d) nests, (e) sprayer, (f) weighing machine, and (g) debeaking equipment.

SUGGESTED ACTIVITIES

1. Making feeders for birds of different ages.
2. Making a watering pot or fountain for them.
3. Making a roost for layers.
4. Keeping weight records (weekly) of all birds.
5. Taking field trips to different local poultry firms.
6. Making a poultry nest for about 12 birds.

XII. POULTRY SANITATION AND DISEASES

A. Nature and economic environment in poultry diseases.
The diseases:-

1. Protozoa - Coccidiosis
2. Fungi - Asperogilosis, Mycosis, Favus
3. Bacteria - Cholera, Typhoid, Tuberculosis, Pullorum
4. P.P.L.O. - CRD
5. Virus - Fowl Pox, Newcastle, Bronchitis, Laryngotrachetis, Leocosis

SUGGESTED ACTIVITIES

1. Disinfecting the poultry house
2. Vaccinating birds
3. Caring for a sick bird
4. Studying internal abnormalities by autopsy of birds
5. Surveying local poultry diseases

N.B. Two of the following areas in bird keeping are compulsory:

1. Raising broilers
2. Raising pullets
3. Management of breeding flock
4. Management of layers

List of Agricultural Tools and Equipment
for Multipurpose High School

Paper I

S.No.	Description	Quantity
1.	Max-Min. Thermometer	1
2.	Dry and Wet Bulb Thermometer	1
3.	Rain Gauge	1
4.	Weather Cock	1
5.	Wind anemometer	1
6.	Barometer	1
7.	Water Evaporation Measuring Tank	1
8.	Hygrometer	1
9.	Soil testing Kit	1
10.	Hard glass Test Tubes	34
11.	Soil Percolation Tubes	34
12.	Capillary Tubes	34
13.	Osmosis Tubes	34
14.	Litmus paper, red	12 packets
15.	Litmus paper, blue	12 Packets
16.	Kodali or Chabey 9"x9"	20
17.	Kodalo	20
18.	Chuchey Kuto	20
19.	Patey Kuto	20
20.	Khurpi	20
21.	Hasiya	20
22.	Dalyanthok	20
23.	Garden Hoe	20
24.	Garden Rake	20
25.	Digging Fork	6
26.	Shovel	6
27.	Wheel Barrow	2
28.	Transplanting Trowel	6
29.	Garden Fork	6
30.	Water cans	20
31.	Paddy Thresher	1
32.	Sprayer	1
33.	Dust Sprayer	1
34.	Seed Dressing Drum	1
35.	Budding Knife	20
36.	Grafting tools	20
37.	Pruning Knife	20
38.	Pruning Saw	20
39.	Grass Shears	4
40.	Heavy Shears	2
41.	Scissors	20
42.	Secateur	2
43.	Garden Hatchet	4

S.No.	Description	Quantity
44.	Chopper	2
45.	Stoves (Kerosene)	2
46.	Twine Ball	20 bundles
47.	Rope	100 yards
48.	Rubber hose pipe	200 feet
49.	Wax pencils	10
50.	Zinc plates	12 dozen
51.	Name plates	30
52.	Map of Nepal showing climate and rainfall	1
53.	Map of Nepal showing natural vegetation	1
54.	Map of Nepal showing agricultural products	1
55.	Charts dealing with Horticulture	12
56.	Charts dealing with Agronomy	8
57.	Charts dealing with agricultural plants	6
58.	Seeds and seed bottles	36
59.	Measuring tape 50'	1
60.	12" Scale	20
61.	First Aid Kit	1

Paper II

Poultry and Livestock Equipment

S.No.	Description	Quantity
1.	Incubator	1
2.	Brooder stove with hover (Kerosene)	1
3.	Poultry weighing machine with weighing basket	1
4.	Dissecting Kit	1
5.	Poultry Shears	1
6.	Candler	1
7.	Debeaker	1
8.	Egg Grader with Scale	1
9.	Dehorner	1
10.	Castrator	1
11.	Brush (large)	1
12.	Milk Testing Equipment	1
13.	Lactometer	1
14.	Syringe with needles	1
15.	Milking can	2
16.	Water bucket	2
17.	Waterer	6
18.	Feeder	6
19.	Wool Shearing Scissors	2
20.	Knife, long and small	2
21.	Grinding Stone	1
22.	Broom	4
23.	Equipment to prepare ghee, curd, butter, khuwa, etc.	1 set
24.	Butchering knife	1
25.	Maps and charts dealing with Animal and Poultry Husbandry	12
26.	Slide projector	1
27.	Towels	4

Repair and Maintenance Equipment

1.	Ball peen hammer	4
2.	Claw hammer	4
3.	Rip saw	2
4.	Cross cut saw	2
5.	Screw driver	4
6.	Wrenches, 6" and 8"	2
7.	Wire cutter	1
8.	Can opener	1
9.	Chisel, cold (metal) and wood	4
10.	Plane	4
11.	Drilling auger	2
12.	Twisted bits	1 set
13.	Pliers	2
14.	Ratchet brace	2
15.	Auger bits	1 set
16.	Triangular file	1 doz.

Furniture

S.No.	Description	Quantity
1.	Blackboard 6'x4'	2
2.	Magazine rack	1
3.	Cabinet and seed rack	1
4.	Student's chair	20
5.	Student's table	20
6.	Teacher's chair	2
7.	Teacher's table	2
8.	Almirahs	3
9.	Notice board	1
10.	Display board	2
11.	Map stand	1
12.	Chart stand	1

General Reference Books

1. "Planning A Landscape Garden in India," by L. N. Bista
2. "Tweed's Poultry Keeping in India"
3. "Poultry Keeping in India," by Naidu
4. "Livestock and Poultry Production," by Harbans Singh and Earl N
5. "Practical Animal Husbandry," by Miller and Robertson
6. "Garden," by Ganga Bikram Sijapati
7. "Introduction to Agriculture," by Hutram Vaidya
8. "Agricultural Science," by Hutram Vaidya
9. "Vegetable Garden (Around the House)," by Ganga Bikram Sijapati
10. "Vegetable Garden", by Narayan Hulachand Byash
11. "Fruit Garden (Plantation)," by Narayan Hulachand Byash
12. "Agricultural Tools and Equipment", by Narayan Hulachand Byash

NEPAL VOCATIONAL AGRICULTURE

TEACHER'S HANDBOOK -- PART II

Lesson Plan Preparation

Discussion of Teaching Methods

Specimen Lesson Plans

LESSON PLAN PREPARATION

The role of the vocational agriculture teacher is varied and complex. He must perform a long list of tasks. The common, recurring task is the preparation of daily lesson plans. The lesson plan is an outgrowth of the teacher's course outline and calendar of operations.

It is difficult to discuss methods, objectives, or lesson preparation as a single concept. Each becomes an integral part of the other in the educational effort. Objectives as well as type of method to be used have a direct influence on lesson plans the teacher prepares.

A Lesson Plan can be defined as an outline or systematic written program to be followed in teaching a lesson. It is the plan to be followed by the teacher in using a teaching method to meet a specific educational objective.

An Objective is a clear, concise statement of the end result the teacher wishes to achieve by teaching the lesson. It may be a single statement, or a lesson may have more than one objective. Objectives should be stated in definite, measurable terms. There are several types of objectives, depending on the end result desired, and they may be classified as follows:

1. Knowledge, understanding objectives.
2. Abilities, skill objectives.
3. Interest, appreciation, ideas and desires (emotional attitude), objectives.
4. Practice and habits objectives.

It is unlikely that lessons can be developed that consider only one type of objective. To develop skill requires some knowledge. As a result, lesson plans may have both understanding and ability objectives. The purpose is to state the desired results as clearly as possible. What is the student supposed to know or be able to perform at the completion of the lesson?

The objective becomes part of the lesson plan and largely dictates the method to be used in teaching. It also becomes a standard against which final evaluation will be made to determine the effectiveness of the teaching.

Kinds of Methods. Many kinds of techniques or methods are used in teaching. The following list suggests those which could be adapted for use in the Vocational Agriculture Program:

1. Lecture.
2. Group discussion.
3. Supervised study and discussion.
4. Demonstration.
5. Manipulative skills training.
6. Field trip.
7. Problem solving.

Lesson Plan Outline. All lesson plans, regardless of technique used, should follow a general outline or form. Educators agree that certain components are essential to every lesson plan. They are:

A. Pre-Classroom Components of the Lesson Plan.

1. Enterprise. This is a one- or two-word statement to assist in identifying the general area in which the lesson is to be taught. Enterprises include Livestock, Agronomy, Poultry, Horticulture, Farm Mechanics, and Soils.

2. Unit. The unit is a brief statement giving more specific information on the teaching plan. For a poultry enterprise, units might include: Feeding, Breeds, Broiler Production, Laying Production, Diseases, etc. In Soils, it might include Soil Conservation, Fertilization, etc.
3. Lesson. The lesson title should indicate specifically what is to be covered in the lesson plan.
4. Name. It is always desirable to place the writer's name on the lesson plan. If the plan is completed correctly, the writer should be glad to have his name appear on it.
5. Class and Date. Experience has shown that it is desirable to provide a space to list the class to which the lesson was taught and the date it was given. This will give a solid reference point when reviewing and evaluating the program. If the lesson plan is satisfactory and reusable, the teacher will know when and where it was previously used.
6. Objectives. Objectives should be stated clearly in measurable terms. They should be stated specifically and in such manner as to ensure that the teacher knows exactly what the student is to learn and be able to do when the lesson has been completed. This will make it possible for the teacher to select a teaching method to be followed.

Objectives stated correctly will provide a performance goal that can be used in final lesson evaluation.

7. Tools and Equipment. This is the section under which the teacher lists specific tools and equipment that will be needed to accomplish the teaching of the lesson.

8. Materials. Expendable supplies to be used in a skills lesson or demonstration are listed here. If the lesson plan calls for student practice, sufficient amounts of materials must be listed for the total class.

Items 7 and 8 are segments of primary significance in demonstration or manipulative skills lesson plans.

9. Teaching Aids. Almost all lessons, regardless of type, will require some teaching aids. There are aids in use that are so common the teacher may not consider them teaching aids. A more detailed discussion will be presented on teaching aids; however, the teacher should be aware that everything used to assist in lesson completion could be considered a teaching aid, including chalkboard, specimens, charts, mock-ups, etc.

The teacher is responsible for this section of the lesson plan and will not share it with the class. The sole purpose of this section is to assist the teacher in determining clearly what is to be done in preparing to teach the class.

10. References required by the student should be listed so the teacher can have them available. This section might be sub-headed "student references" and "teacher references."

It is also desirable to list the exact teacher's references, including page numbers from which supportive information was secured. A properly prepared lesson plan can be used more than once; at least it can be used as a good guide for preparation of an improved lesson plan. As such, it is desirable to know exactly where the information was obtained.

11. Time schedule. Classes vary in length, and a lesson plan can not always cover exactly one class period. Some will be shorter, others longer. To avoid confusion, the teacher should prepare a time schedule that can be followed in teaching the lesson. As near as possible, each of the lesson plan's four parts should be assigned a time period and the teacher should make an effort to meet this schedule. Allowances will be made for class needs, but continuous deviation from the time schedule will cause difficulties in completing the lesson.

B. Classroom Presentation. The teacher should follow four basic steps in teaching a lesson:

1. Preparation is the first phase of the lesson and has two major purposes:

   a. The class has arrived and it is time to begin the lesson. Each member is talking and thinking about his own problems. The teacher must attract and focus the student's attention on the subject of the lesson.

   b. After gaining attention, the teacher must motivate the students to want to learn what is to be taught.

      Several motivational techniques can be used; essentially they follow a basic pattern. The teacher must motivate the student to answer the following questions:

      "What is the job to be understood and performed?"

      "Why is it desirable to know?"

      Another approach might be:

      "How can the student use the information?"

      "How will this help him to be a better farmer?"

This should be a brief, concise effort consuming not more than five minutes. It should help to prepare the students for receptive learning.

2. Presentation is the section of heaviest responsibility for the teacher, who presents the material for the students to learn. Information required by the students for meeting objectives is presented in this section.

Material must be carefully prepared and presented in logical sequence. This provides for development of knowledge or skills, building on previous knowledge. It should be structured to ensure that the class understands the steps and can participate by asking questions as needed.

A slightly different form will be presented for this area in the skills and demonstration lesson.

3. Application. In this section, the student will have an opportunity to apply the new knowledge to his home-farm problems. In the lecture method, it will be very difficult because it is all done orally. The teacher must lead a discussion on how this applies to individual situations. (A slightly different technique can be used in the skills lesson and will be discussed later.)

4. Follow-up provides the teacher with an opportunity to be assured that the information presented will be applied. In the skills development area this involves practice of skills by the student while the teacher evaluates the work. For theory, the teacher may use a quiz (oral type) to find out how well the Young Farmers have learned the information.

These steps will vary in strength depending on the type of lesson to be taught.

Post-Class Teacher Activities

At this stage, formal presentation ends, There is, however, a very important post-classroom phase in which the teacher must be involved: "Evaluation"!

Evaluation must be completed in two steps, or phases. Phase one can be completed almost immediately after the class. The question to be answered is "How good was the lesson presentation?" This is determined by considering class attention and response. The teacher must make notes on the lesson plan, suggesting methods by which the lesson could be improved from a presentation standpoint.

The second phase of evaluation is complicated and critical. How efficiently did the class adopt and implement the knowledge presented? How well did the lesson meet objectives? A lesson can be taught in an excellent manner, but if the learner does not implement what was learned, nothing is gained. This may take considerable time, as the learner may not have an opportunity to implement the acquired knowledge or skill for several weeks. The teacher must wait before making a judgment.

To provide the teacher with a quick check or guide to the lesson plan, an outline has been prepared:

(See following page)

Enterprise:

Unit:

Lesson Plan:

Name:

Class and Date Taught:

A. Pre-class Activities

1. Objectives:
2. Tools and Equipment:
3. Materials Needed:
4. Teaching Aids:
5. References: (a) Teacher: (b) Student:
6. Time Schedule:

B. Classroom Presentation Section

1. Preparation:
2. Presentation:
3. Application:
4. Follow-up:

C. Post-class Activities

1. Evaluation
   a. Procedure or Method used in teaching.
   b. Adoption of practices taught.

DISCUSSION OF TEACHING METHODS

Lecture. The lecture method is useful in providing information. It will meet the type of objective including development of interests, appreciation, ideas, and desires (emotional attitudes).

From the teacher's standpoint, the lecture is least difficult to prepare. It requires less supportive material in terms of teaching aids and equipment. Being easier to prepare might induce teachers to consider using it until they identify the limitations. The lecture method is least effective in skills training and providing understandings.

Group Discussion. The group discussion is a desirable technique to provide group participation. It is sound from the educational standpoint, because students need to participate. The instructor must direct the discussion carefully to prevent any one student from taking control of the class.

The major strength of this method probably is its weakness, also. When properly directed, the class has a chance to participate. The technical knowledge available is limited to the composite knowledge of the class. The teacher must make sure that the information presented in group discussions is valid and valuable to the Young Farmers.

Supervised Study and Discussion. This method may be defined as a system which allows students to participate in securing information and drawing conclusions. It can be used effectively as a method of reaching two types of objectives. It can assist in meeting objectives requiring knowledge and understanding. The discussion provides ample opportunity for the teacher to determine the level(s) of understanding. The method also can be used to achieve objectives aimed at interest, appreciation, ideas, or desires.

The method is organized into a series of progressive steps:

1. The teacher discusses the lesson objective and endeavors to stimulate interest.

2. Class and teacher then determine a list of questions that must be answered.

3. The teacher directs the students in a brief period of supervised study of selected references. This could include texts, notebooks, bulletins, or resource materials the teacher has secured for this purpose.

4. The class will then discuss and answer each question.

5. The final stage is to determine conclusions and propose steps the Young Farmer should implement on the home-farm.

The first three methods discussed (lecture, group discussion, and supervised study and discussion) are all acceptable, recognized teaching methods. There are several similarities, some advantages and disadvantages in the systems.

The methods discussed offer the teacher:

a. Major responsibility for knowledge.
b. Limited action participation.
c. Major role to produce interest or knowledge.
d. Limited opportunity to hold attention of students.

As a result of the lack of student participation and lack of skill development charcteristics, the teacher should use these methods only after careful and considerate evaluation.

Problem-Solving. The problem-solving technique is used whenever it is possible to form a definite decision or understanding, e.g., "Is your home flock making money?" or "How is a seed formed?" or "What elements are essential for plant growth and where are they found?" It is an important and commonly used method in the teaching of agriculture. The procedure involves:

1. Presenting a problem to the class in clearly stated question form so students will know its significance and have an interest in the possible solution.

2. Analyzing the problem with the class. What must be known? What factors are to be considered? What steps should be followed to reach a solution? Secure a number of questions from the students and place them on the blackboard. Provide some answers (from class or notes) that will give background for a solution. Unanswered questions are used in assignments for study. Such procedures should help the student to understand the procedure for indentification, analysis, and determining a solution to the problem.

3. References or readings suggested by the teacher or students where information is available and helpful in problem solving. This may be a part of an assignment.

4. Directed or Supervised Study is given for students to obtain information from texts, bulletins, etc. Each student solves the problem for himself. The teacher's job is to work among the Young Farmers, helping them with difficulties and assisting them in finding answers. This may be the teacher's busiest time of the period. Generally, this is the longest step of the class period, and it may involve home study.

5. Group Discussion generally should follow the study or be scheduled for the day after study. Here, the teacher organizes class discussion and leads it to a solution. It is not just answering questions to the assignment but leads to problem-solving techniques.

6. A part of the group discussion may well be the application or use of the decision of the school farm or on the home-farms.

Certain problems arise with use of the problem-solving technique. As seen by the procedure used, it requires considerable time. Problems must be well outlined, answers must be found (requires adequate testing in sufficient number), and proper conclusions determined. Any one of these can become a limitation, reducing its desirability as a teaching technique.

Demonstration: The agriculture teacher may use two basic types of demonstrations with the adult class. Results demonstrations generally are used with crops and crop production to show the superiority of some new method or technique. It might include showing the value of cultural practice, fertilization, insect control, improved variety of seed, or any number of methods that represent an improvement in production of the crop being considered. This type of demonstration requires considerable effort and work. It is, in fact, a technique in itself and will not be discussed further in this presentation.

Skills Demonstrations can best be used by the teacher in training for specific skills or abilities. The demonstration can be used to assist in developing understanding. Properly prepared, a demonstration can show a procedure to be followed in practice. A demonstration with another emphasis can be used efficiently for development of interest or implementation of ideas. This makes variations of demonstrations the most versatile teaching method thus far discussed. The teacher must remember that each purpose will require slightly different emphasis. The demonstration follows the same lesson plan as mentioned before, but emphasis is placed on the teacher's demonstration and the student's practice rather than discussing the method.

Manipulative Skills Training. This type of teaching technique encompasses all possible steps of the lesson plan. The objective is to enable the student to perform a specific skill. This system will follow the same pre - and post-class activities as discussed in previous methods.

Class presentation will vary, due to the emphasis on "student doing." It is desirable to divide the skill presentation into two separate phases. This will ensure that the information is presented in logical steps. Emphasis will be as follows:

1. PREPARATION

During this stage the teacher must prepare or motivate the learner for the subject or topic to be taught. This also is a desirable place to ask the Young Farmer preparation questions including:

A. What experience do you have in this area?
B. Why is it necessary to know this skill?
C. How can it be used to make you a better farmer?

II. PRESENTATION (of the skill)

Operation or Steps	Key points
The operational column will include the steps in sequence as they are to be presented, learned, and performed by the students.	The key points are sub-steps, or a breakdown which gives the required detail.

The "PRESENTATION" phase concerns the teacher's giving the demonstration to the class. This means that the instructor must be prepared to make a presentation, showing all the skill steps the young farmer is expected to learn and later perform.

III. APPLICATION

During the "APPLICATION" stage, the student or learner practices the steps as they have been demonstrated in the "PRESENTATION" phase of the lesson. This is done under close observation and supervision by the teacher. The teacher must monitor the various steps carefully to ensure that the student is learning the skill properly.

IV. FOLLOW-UP OR EVALUATION.

During the follow-up stage, the student should be able to perform the skill at the standard level. This should be compared and measured easily against the "OBJECTIVES".

To aid in evaluation of a demonstration and/or manipulative skills lesson, several questions can and should be asked. Listed below are questions the teacher must answer:

A. Overall Preparation

1. Was the job divided into logical steps?
2. Were important points stressed?
3. Were notes used appropriately?
4. Were all tools, materials, supplies, and teaching aids available?

B. Motivation

1. Was the student's knowledge of the job known?
2. Was the importance of the job developed?
3. Were applications of the demonstrations related to the student's present knowledge and future use?
4. Was a high level of interest developed?
5. Were the students made aware of the important points?

C. Teaching on the Job

1. Were new terms, parts, and functions emphasized?
2. Was only one step at a time demonstrated?
3. Was each step demonstrated in proper sequence?
4. Were questions asked to determine student understanding?
5. Were safety precautions discussed and followed?
6. Were audio-visual aids used appropriately?
7. Could students see and hear readily at all times?
8. Was the time for the demonstration sufficient for securing student understanding?
9. Were students required to repeat some steps to check understanding?
10. Were key points summarized by or with students?

D. Student Practice

1. Was there opportunity for student application immediately after the demonstration?
2. Were correct work habits developed?
3. Were steps repeated to assure understanding necessary for slower students?
4. Were students supervised in practice?
5. Did students evaluate their work with the instructor?

Field Trip. The field trip is a class activity requiring that the group be taken to a specific place for a specific purpose. It can be used when bringing the required information or material to the farm is not feasible. As with every other technique, there are advantages and disadvantages to this method.

Advantages:

1. Breaks the classroom hold on the learner.
2. Increase opportunity to learn by doing.
3. Is realistic; learner can see, hear, smell, and feel the "real" thing.
4. Provides excellent opportunity to motivate students and develop strong public relations.

Limitations:

1. It is only fair to note that it takes considerable effort on the teacher's part to prepare successfully a lesson plan which includes the field trip.

The teacher may consider the following items in the evaluation of a field trip.

Can the teacher say that the:

1. Purpose of the trip was clear and definite?
2. Trip contributed to classwork under way or soon to follow?
3. Members of the class assisted in developing questions to be asked and observations to be made?
4. Assignment of student responsibilities was made in advance?
5. Previous arrangements were made at the farm or place to be visited?
6. Arrangements for transportation were carefully made in advance?

7. Students were under teacher direction at all times?
8. Degree of student interest was high at all times?
9. Students made appropriate notations and observations?
10. Proper courtesies were shown to persons at the place visited?
11. Trip was concluded within the time allotted?
12. Students participated in evaluating the trip?
13. Students summarized the trip and made appropriate conclusions?
14. Trip contributed to improved farming programs through learning and applying new skills and increasing knowledge?
15. Safety rules were observed?

SPECIMEN LESSON PLANS

The following lesson plans were prepared by Vocational Agriculture Teachers of Nepal during a workshop conducted by the Ministry of Education's Multipurpose High School Division. Teachers who attended the work shop and prepared the lesson plans jointly with Dr. Woods and Dr. Stitt were:

Madan Prasad Adhikari
Tri-Juddha MPHS
Birgunj

Ram Nath Bastola
Public MPHS
Dharan

Ram Chandra Jha
Public Bindeshwori MPHS
Rajbiraj

Sri Hari Sharma
Mangal Prasad MPHS
Nepalganj

Tanka Prasad Sharma
Padmodaya Public MPHS
Bharatpur, Dang

The lesson plans are offered as a guide for your use in developing your skills in lesson plan preparation. These lessons, much like those you will prepare, reflect the personality and emphasis of the writer. It should be mentioned that the group's feeling was that the major weakness lay in two general areas:

1. An insufficient amount of technical information is included in the teacher presentation section. Lesson plans prepared by you can be improved by adding the needed technical information.

2. No references are listed in most cases. These were omitted because all schools do not have the same references available. The teacher will know what references are available in his school and should include them in the lesson plan.

The lessons are intended to give you guidance and direction in starting a complete file for your Vocational Agriculture Program. You are encouraged to make every effort to develop a complete file including a well-prepared lesson plan for each class you teach.

ENTERPRISE: Horticulture UNIT: Radish Production

LESSON NO. 1 TITLE: Importance of Radish and Site Selection

NAME: _____ CLASS: _____ DATE: _____

OBJECTIVES:

1. Develop maximum understanding of the importance of radish.
2. Develop maximum ability to understand the importance of the site for radish production.

ELEMENTS:

1. Importance of the radish.
2. Criteria for site selection.

TIME SCHEDULE: 45 minutes.

TOOLS AND EQUIPMENT: Blackboard and chalk.

SUPPLIES: Radish.

TEACHER'S PRESENTATION:

1. Bring a radish to class.
2. Explain its utility as:
   a. Source of minerals and vitamins.
   b Uses -- as vegetable, salad, pickle.
3. Explain the criteria for site selection:
   a. Well-drained.
   b. Fertile land.
   c. Soil -- loamy or sandy loam.
   d. Open area.

STUDENT'S APPLICATION:

1. Examine the radish.
2. Discusses its uses.
3. Discusses criteria for site selection.

FOLLOW-UP:

1. Oral questions by teacher:
   a. What are the uses of the radish?
   b. Can you grow it in a muddy field?
   c. Explain its requirements.

POST-CLASS EVALUATION:

1. Were stated objectives reached by this lesson?
2. What improvements could be made in this lesson plan to improve it for further use?

ENTERPRISE: Horticulture UNIT: Radish Production

LESSON NO: 2 TITLE: Soil Preparation and Seed Selection

NAME _____ CLASS: _____ DATE: _____

OBJECTIVE:

1. Develop maximum knowledge and skill on the part of the students in:
   a. Preparation of soil for radish production.
   b. Identification of different radish seeds and their quality.

ELEMENTS:

1. Soil preparation for the radish.
2. Identification of different varieties of radish seeds.
3. Quality determination.

TIME SCHEDULE: 45 minutes.

TOOLS AND EQUIPMENT: Blackboard, chalk, spade, dalyantho, rake.

SUPPLIES: Radish seeds.

TEACHER'S PRESENTATION:

1. Brief review of previous lesson.
2. Determine student knowledge in soil preparation and seed identification.
3. Soil Preparation: (Demonstration by Teacher)
   a. Dig 6 inches deep with spade.
   b. Break clods with dalyantho or mungro.
   c. Rake field to remove weeds and other foreign materials.
   d. Level field.
4. Seed selection:
   a. Identify Pynthane, Japanese, and local radish seeds.
   b. Explain and show characteristics of a good seed.
      (1) Absence of foreign materials and dirt.
      (2) Big and solid grain of seed.
      (3) Certified from a registered firm.

STUDENT'S APPLICATION:

1. Prepare soil.
2. Identify kinds and characteristics of given seeds.

FOLLOW-UP:

1. Identification of seeds.
2. Participation in discussion of soil preparation.
3. Oral quiz.

POST-CLASS EVALUATION:

1. Were stated objectives reached by this lesson?
2. What improvements could be made in this lesson plan to improve it for further use?

ENTERPRISE: Horticulture UNIT: Radish Production

LESSON NO. 3 TITLE: Seeding the Radish

NAME: _____ CLASS: _____ DATE: _____

OBJECTIVES:

1. Learn the proper method of seeding the radish.
2. Learn proper spacing, depth, time of seeding, soil conditions, and quantity of seed required for radish seeding.

ELEMENTS:

1. Seeding in a row.
2. Spacing.
3. Diameter of seed.
4. Soil condition.
5. Quantity of seed.

TIME SCHEDULE: 45 minutes.

TOOLS AND EQUIPMENT: Scale (measuring tape), kuto or hoe, water can.

SUPPLIES: Seed, thread, water.

TEACHER'S PRESENTATION:

1. Review of student's previous knowledge in order to obtain information and background necessary to present the lesson.
   a. Explain elements.
   b. Demonstrate elements on blackboard and in field.

STUDENT'S APPLICATION:

1. Seed identification.
2. Demonstration of ability to select seed.
3. Demonstration of ability to seed, space, prepare soil, and calibrate.

FOLLOW-UP:

1. Demonstration of ability in practice.
2. Oral questions.

POST-CLASS EVALUATION:

1. Were stated objectives reached by this lesson?
2. What improvements could be made in this lesson plan to improve it for further use?

ENTERPRISE: Horticulture UNIT: Radish Production

LESSON NO. 4 TITLE: Cultivation of the Radish

NAME: _____ CLASS: _____ DATE: _____

OBJECTIVES:	1. Develop understanding of cultivation of the radish. 2. Develop skill in cultivation of the radish.
ELEMENTS:	Understanding of and performance in cultivation.
TIME SCHEDULE:	45 minutes.
TOOLS AND EQUIPMENT:	Kuto, Hoe.
TEACHER'S PRESENTATION:	1. Discuss with students importance of cultivation. 2. Explain needs of cultivation in radish production. 3. Demonstration of cultivation procedure by teacher.
STUDENT'S APPLICATION:	1. Participation with teacher on importance of cultivation. 2. Performing cultivation activities under supervision of teacher.
FOLLOW-UP:	1. By oral questions. 2. Demonstration of ability in the field.
POST-CLASS EVALUATION:	1. Were stated objectives reached by this lesson? 2. What improvements could be made in this lesson plan to improve it for further use?

ENTERPRISE: Horticulture UNIT: Radish Production

LESSON NO. 5 TITLE: Insect and Disease Control

NAME: _____ CLASS: _____ DATE: _____

OBJECTIVES:	1. Develop maximum understanding of the importance of insect and disease control. 2. Develop maximum ability in control of insects and diseases of the radish.
ELEMENTS:	Spraying and dusting.
TIME SCHEDULE:	45 minutes.
TOOLS AND EQUIPMENT:	Sprayer.
SUPPLIES:	Chemicals and water.
TEACHER'S PRESENTATION:	1. Discuss with students insects and diseases, losses, symptoms, how they can be controlled. 2. Discuss insecticides to use, how to mix them, precautionary measures. 3. Demonstrate use of sprayer, mixing, application.
STUDENT'S APPLICATION:	1. Review. 2. Students will prepare chemicals and use sprayer properly under supervision of teacher.
FOLLOW-UP:	1. Oral questions. 2. Demonstration of ability in the field.
POST-CLASS EVALUATION:	1. Were stated objectives reached by this lesson? 2. What improvements could be made in this lesson plan to improve it for further use?

ENTERPRISE: Animal Husbandry UNIT: Animal Husbandry and Dairying in Nepal (Introduction)

LESSON NO. 1 TITLE: Importance of Animal Husbandry and Dairying in Nepal

NAME:_____ CLASS:_____ DATE:_____

OBJECTIVE:

1. Broaden students' knowledge in:
   a. Value of farm animals in Nepal.
   b. Uses of animal products in daily life.

ELEMENTS:

1. Value of animals in farming.
2. Animal products in daily life.

TIME SCHEDULE: 45 minutes.

EQUIPMENT: Charts, blackboard, chalk, duster.

TEACHER'S PRESENTATION:

1. Determine student's knowledge in animal husbandry.
2. Make a list of domestic farm animals and show purpose of each.
3. Determine answers for the following questions:
   a. What is your shoe made of?
   b. What does your bullock do in farming?
   c. What is the present price of a mana of milk?
   d. What are the byproducts of milk?
   e. Why do you take milk and ghee?

STUDENT'S APPLICATION:

1. Participation in class discussion.

FOLLOW-UP:

1. Review.
2. Oral quiz.

ENTERPRISE: Animal Husbandry UNIT: Dairying

LESSON NO. 2 TITLE: Terminology of the External Parts of a Cow

NAME:_____ CLASS:_____ DATE:_____

OBJECTIVE:	Develop maximum ability to: 1. Identify important external parts of a cow. 2. Enrich vocabulary in animal anatomy and physiology.
ELEMENTS:	External parts of a cow.
TIME SCHEDULE:	45 minutes.
EQUIPMENT:	Charts, handouts, blackboard, chalk, duster.
TEACHER'S PRESENTATION:	1. Draw a full blackboard figure of a cow. 2. Ask each student to identify and label one part at a time. 3. Determine the function of each part. 4. Show a prepared chart which gives correct terminology of all external parts of a cow. 5. Compare chart with previously drawn blackboard figure. a. Add necessary terminology to blackboard figure. b. Explain and illustrate their functions.
STUDENT'S APPLICATION:	1. Identify external parts of a cow which they already know. 2. Explain function of each part. 3. Recognize new parts and fill in a blank chart given to them.
FOLLOW-UP:	1. Participation. 2. Correctness in completing blank chart at end of class.

ENTERPRISE: Animal Husbandry UNIT: Dairying

LESSON NO. 3 TITLE: Importance of Dairy Animals

NAME:_____ CLASS:_____ DATE:_____

OBJECTIVES: Develop understanding of:

1. Nutritional value of milk and milk products.
2. Dairy animals as consumers of non-marketable farm products and converters into valuable human food.
3. Dairy animals as a source of income and power.

ELEMENTS: Milk as a perfect food, its economic importance, and the cow as a source of power.

TIME SCHEDULE: 45 minutes.

EQUIPMENT: Charts, blackboard, chalk, duster.

TEACHER'S PRESENTATION:

1. Brief review of previous lesson.
2. List cow, buffalo, goat and sheep as milk animals, but give emphasis to first three.
3. Explain and discuss, with the help of charts and diagrams, nutritional value of milk and milk products:
   a. Source of Vitamins: A, B, C, D, E for energy and body-building.
   b. Source of Minerals: Ca, P (bone buildup).
   c. Source of Protein: Growth and body building.
   d. Source of energy and easily digested.
4. Explain and discuss price increases of milk.
5. Explain briefly feed requirements of the dairy animal--farm byproducts and their conversion into milk.
6. Explain and discuss price of a male calf and its uses on the farm.

STUDENT'S APPLICATION:

1. Review of different points of lesson to show a clear understanding of all points.

FOLLOW-UP:

1. Review.
2. Oral quiz.

ENTERPRISE: Animal Husbandry UNIT: Dairying

LESSON NO. 4 TITLE: Importance of Meat Animals

NAME: _____ CLASS: _____ DATE: _____

OBJECTIVES:

1. Develop understanding of:
   a. Nutritional value of meat.
   b. Meat animals as consumers of farm byproducts and converters of these into valuable human food.
   c. Meat animals as a source of money and power.

ELEMENTS: Meat as a nutritional food; meat animals as a source of power.

TIME SCHEDULE: 90 minutes (two 45-minute periods).

EQUIPMENT: Charts, blackboard, chalk, duster.

TEACHER'S PRESENTATION:

1. Review goat, sheep, pig, and buffalo as meat animals.
2. Explain and discuss, with the help of charts and drawings, nutritional value of meat.
3. Source of energy, vitamins, minerals, fat, protein, and easily digestible.
4. Explain price increases of meat.
5. Explain and discuss how meat animals consume farm byproducts and home waste materials, converting them into meat.
6. Explain how male buffalo can be used for farm power.
7. Take class on field trip and identify parts of all farm animals on the farm.

STUDENT'S APPLICATION:

1. Review of lesson to show a clear understanding of all points.

FOLLOW-UP:

1. Review.
2. Oral quiz.
3. Demonstration of ability on field trip.

ENTERPRISE: Animal Husbandry UNIT: Dairying

LESSON NO. 5 TITLE: Selection of Dairy Breeds

NAME: _____ CLASS: _____ DATE: _____

OBJECTIVES: Develop understanding of:

1. Different Indian breeds of dairy animals.
2. Internationally renowned breeds for dairying.

ELEMENTS: Indian and internationally renowned dairy breeds.

TIME SCHEDULE: 90 minutes (two 45-minute periods).

EQUIPMENT: Charts, blackboard, chalk, duster.

TEACHER'S PRESENTATION:

1. Review of cow, buffalo, and goat as dairy animals.
2. Explain and illustrate with the help of diagrams, charts, and a type or species of animal that is available;
   a. Red Sindhi and Mariana as good Indian dairy cow breeds.
   b. Marrah and Mili as good Indian dairy buffalo.
   c. Jamma Pari and Sannan as good Indian and Israeli breeds of dairy goats.
   d. Holstein, Jersey, Ayershire, Guernsey, Brown Swiss as internationally recognized good breeds of dairy cattle.
   e. Selection of breed according to locality, personal preference, and adaptability of given breed.

STUDENT'S APPLICATION:

1. Identification of different breeds by color, patterns, size, horn, poll, hump, etc.

FOLLOW-UP:

1. Identification of different breeds from prepared charts.
2. Review.
3. Oral quiz.

ENTERPRISE: Animal Husbandry UNIT: Breeds

LESSON NO. 6 TITLE: Selection of Breeds for Meat

NAME: _____ CLASS: _____ DATE: _____

OBJECTIVES: Develop understanding of:

1. Fast growing and heavy weighing breeds of goats, lambs, swine and buffalo.
2. Tasteful and good flavored meat producing animals.

ELEMENTS: Profit, good flavor, and tasteful meat producing breeds of goat, lamb, swine and buffalo.

TIME SCHEDULE: 90 minutes (two 45-minute periods).

EQUIPMENT: Charts, blackboard, chalk, duster.

SUPPLIES: Goat.

TEACHER'S PRESENTATION:

1. Review of goat, lamb, pig, buffalo as meat animals.
2. Explain meat animals with the help of diagrams, charts, and available animals (goat).
   a. Madise Khasi and Chyangra as good quality meat animals.
   b. Thumba, Kage, and U. P. sheep as meat lambs.
   c. Nagpuri, Murrah, and Nili males as quality meat buffalo.
   d. Nepalese Banel, New Hampshire, and Yorkshire as good breeds of swine.

STUDENT'S APPLICATION:

1. Identification of different breeds.
2. Discussion of breeds by color, markings, size, horn, poll, hump, etc.

FOLLOW-UP:

1. Review.
2. Oral quiz.
3. Identification of breeds of animals from chart.

ENTERPRISE: Animal Husbandry UNIT: Breeds

LESSON NO. 7 TITLE: Upgrading Local Animals

NAME: _____ CLASS: _____ DATE: _____

OBJECTIVES: Develop understanding of:

1. Breeding principles.
2. Mating local animals with certain foreign breeds.

ELEMENTS: Upgrading principles through inbreeding, crossbreeding, and line breeding.

TIME SCHEDULE: 90 minutes (two 45-minute periods).

EQUIPMENT: Charts, chalk, blackboard, duster.

TEACHER's PRESENTATION:

1. Determine student's knowledge of breeding principles and practices.
2. Inbreeding: Close relatives = animal of desired type to fix a desired characteristic.
3. Crossbreeding: Mating of different breeds of same species.
4. Linebreeding: Mating of animals of same breed within a good "line" of animals.
5. Upgrading local animals through:
   a. Panchayat bull.
   b. Artificial insemination.
6. Show by equation how a local animal mated with a foreign bull can upgrade in four generations:
   a. Sannan + local = A
   b. Sannan + A = A'
   c. Sannan + A' = A''
   d. Sannan + A'' = A''' (almost the same as Sannan).

STUDENT'S APPLICATION:

1. Discussion.
2. Solve elementary genetic problems.

FOLLOW-UP:

1. Review.
2. Oral quiz on genetic problems.

ENTERPRISE: Animal Husbandry UNIT: Reproduction

LESSON NO. 8 TITLE: Care of a Breeding Sire

NAME: _____ CLASS: _____ DATE: _____

OBJECTIVE: Develop understanding of:

1. Need for care of a breeding sire.
2. Different physical needs of a breeding sire.

ELEMENTS: Care and physical needs of a breeding sire.

TIME SCHEDULE: 45 minutes.

EQUIPMENT: Charts, blackboard, chalk, duster.

TEACHER'S PRESENTATION:

1. Determine student's knowledge in care and needs of animals of different ages.
2. Explain terms "care" and "physical needs" of animals.
3. Explain and illustrate:
   a. Why a breeding sire should not be loose and roaming.
   b. How many dams per sire.
   c. Health considerations of a sire as a prime factor in breeding.
   d. Proper food, shelter, sanitation, and freedom from drafts.
   e. Grooming, shearing, dehorning, hoof trimming, and up-to-date records on sire.

STUDENT'S APPLICATION:

1. Discussion and participation to demonstrate clear understanding of care of sire.
2. Field trip for lessons 8, 9, and 10 after lesson 10.

FOLLOW-UP:

1. Oral quiz.
2. Demonstration of ability on field trip.

ENTERPRISE: Animal Husbandry UNIT: Reproduction

LESSON NO. 9 TITLE: Care of Breeding Dam

NAME: _____ CLASS: _____ DATE: _____

OBJECTIVES: Dévelop understanding of:

1. Need for care of breeding dam.
2. Physical needs of dam.
3. Precautions and special care during and after lactation.

ELEMENTS: Care and physical needs of dam.

TIME SCHEDULE: 45 minutes.

EQUIPMENT: Charts, blackboard, chalk, duster.

TEACHER'S PRESENTATION:

1. Review of previous lesson (sire).
2. Explain and illustrate:
   a. Proper food, shelter, sanitation, freedom from drafts, and general health of breeding dam.
   b. When to mate, plus a short review of how to mate.
   c. Proper and timely grooming, shearing, trimming of hoofs.
   d. Other special care during gestation and lactation:
      (1) Isolation as necessary.
      (2) Sanitation.
      (3) Additional nutritional needs.
      (4) Disease control,

STUDENT'S APPLICATION:

1. Discussion of needs and problems.
2. Complete review.
3. Field trip (After Lessons 8, 9, and 10).

FOLLOW-UP:

1. Complete review.
2. Oral quiz.
3. Demonstration of ability on field trip.

ENTERPRISE: Animal Husbandry UNIT: Reproduction

LESSON NO. 10 TITLE: Care of New-Born Calf

NAME:_____ CLASS:_____ DATE:_____

OBJECTIVES: Develop understanding of:

1. Need for special care of baby calf.
2. Physical needs of baby calf.

ELEMENTS: Care and physical needs of baby calf.

TIME SCHEDULE: 45 minutes.

EQUIPMENT: Charts, blackboard, chalk, duster.

TEACHER's PRESENTATION:

1. Review of previous lesson.
2. Explain and illustrate:
   a. Proper food, shelter, sanitation, freedom from drafts, and overall health problems of newly born calf.
   b. Proper and timely grooming, shearing, and trimming of hoofs.
   c. Isolation from dam and other animals.
   d. Amounts of milk necessary.
   e. Time to start on feeds other than mother's milk.

STUDENT'S APPLICATION:

1. Discussion of problems and solutions.
2. Review.
3. Field trip to cover Lessons 8, 9, and 10.

FOLLOW-UP:

1. Complete review.
2. Oral quiz.
3. Demonstration of ability on field trip.

ENTERPRISE: Poultry UNIT: Introduction

LESSON NO. 1 TITLE: General Introductory Material on Poultry

NAME: _____ CLASS: _____ DATE: _____

OBJECTIVES: Develop understanding of:

1. Fowl classed as poultry.
2. Chickens as most common and profitable fowl.

ELEMENTS: Species of poultry; distribution of chickens in the world; profits possible from poultry.

TIME SCHEDULE: 90 minutes (two 45-minute periods).

EQUIPMENT: Charts and posters dealing with poultry, blackboard, duster.

SUPPLIES: Chickens

TEACHER'S PRESENTATION:

1. General discussion relative to domestic poultry.
2. General discussion relative to uses of poultry.
3. Some birds not classed as poultry.
4. General discussion relative to world distribution of poultry.
5. Potential profits from poultry products.
6. Review of discussion.

STUDENT'S APPLICATION:

1. Participation in discussion.
2. Review of fowl classed as poultry.
3. Discuss world distribution.
4. Review possible profits.

FOLLOW-UP:

1. General review.
2. Oral questions.

ENTERPRISE: Poultry UNIT: Introduction

LESSON NO. 2 TITLE: Types of Poultry Industries

NAME: _____ CLASS: _____ DATE: _____

OBJECTIVES: Develop understanding of:

1. Progress of poultry industries.
2. Different segments of poultry industry.

ELEMENTS: Origin and progress of poultry industry, laying flock industry, breeding farm, hatchery, broiler farms.

TIME SCHEDULE: 90 minutes (two 45-minute periods).

EQUIPMENT: Charts, posters, blackboard, chalk, duster.

TEACHER'S PRESENTATION:
1. General discussion of origin and development of poultry industry.
2. Distribution of charts and posters to students and an explanation of each.
3. Review.
4. Summary of total discussion.

STUDENT'S APPLICATION:
1. Explain posters and charts.
2. Make notes of blackboard presentation.
3. Review of origin and development of poultry industry.

FOLLOW-UP:
1. Ability to explain segments of industry.
2. Oral questions.

ENTERPRISE: Poultry UNIT: Introduction

LESSON NO. 3 TITLE: Advantages of Poultry Industry

NAME: _____ CLASS: _____ DATE: _____

OBJECTIVES: Develop understanding of:

1. Advantages of poultry.
2. Place of poultry in totai agricultural economy.

ELEMENTS: Eggs, meat, by-products, and utilization of farm-grown foods not consumed by man.

TIME SCHEDULE: 90 minutes (two 45-minute periods).

EQUIPMENT: Charts and posters illustrating advantages and importance of poultry and poultry products; statistics on poultry products and other agricultural products.

TEACHER'S PRESENTATION:

1. Presentation of poultry and poultry products information on blackboard.
2. Explanation of uses of each product.
3. Distribution of charts and posters and explanation of each item.
4. Review of discussion.
5. Blackboard summary.

STUDENT'S APPLICATION:

1. Making notes of blackboard information on poultry and poultry products.
2. Studying and/or reading charts, posters, and statistics for understanding.
3. Student questions.
4. Review of presented materials.

FOLLOW-UP:

1. Oral questions.
2. Explanations by students.

ENTERPRISE: Poultry UNIT: Introduction

LESSON NO. 4 TITLE: Introduction to Opportunities and Problems of Poultry Enterprise in Nepal.

NAME: _____ CLASS: _____ DATE: _____

OBJECTIVES: Develop understanding of:

1. Opportunities of poultry enterprise in Nepal.
2. Present conditions and problems of Nepalese poultry farmers.

ELEMENTS: Breeds, equipment, feeding facilities, medicines, capital requirements, marketing facilities.

TIME SCHEDULE: 135 minutes (three periods of 45 minutes each).

EQUIPMENT: Charts, blackboard, chalk, bulletins dealing with feeds, breeds and equipment.

SUPPLIES: Medicines.

TEACHER'S PRESENTATION:

1. Discussion of available breeds, feeds, medicines, equipment, and transportation facilities.
2. Discussion of common problems confronting the poultry farmer.
3. Distribution of charts and bulletins.
4. Blackboard presentation of problems.
5. Review of discussion relative to various elements.
6. Blackboard summary of total discussion.

STUDENT'S APPLICATION:

1. Making notes of key points of total discussion.
2. Making notes of problems and explanations of charts.
3. Participation in review.

FOLLOW-UP:

1. Oral questions.
2. Overall understanding.

ENTERPRISE: Poultry UNIT: Introduction

LESSON NO. 5 TITLE: Methods of Poultry Farming

NAME:_____ CLASS:_____ DATE:_____

OBJECTIVES:	Develop understanding of: 1. Different systems of poultry farming. 2. Uses of different systems of poultry farming.
ELEMENTS:	Free-range, fold system, semi-intensive, cage system, battery system.
TIME SCHEDULE:	90 minutes (two 45-minute periods).
EQUIPMENT:	Charts, posters, blackboard, chalk, duster.
TEACHER'S PRESENTATION:	1. General discussion of different systems. 2. Show posters of different systems. 3. Illustrate advantages and limitations of each system through charts and use of blackboard. 4. Review of total discussion. 5. Blackboard summary of total discussion. 6. Field trip to available farms.
STUDENT'S APPLICATION:	1. Discussion with teacher of different systems. 2. Study of charts and posters for maximum understanding. 3. Questions concerning each system. 4. Review of discussion.
FOLLOW-UP:	1. Oral questions. 2. Ability to prepare his own poster of different systems.

ENTERPRISE: Poultry UNIT: Introduction

LESSON NO. 6 TITLE: Suitability of Different Systems

NAME: _____ CLASS: _____ DATE: _____

OBJECTIVES:

1. Develop understanding of:

   1. Conditions favorable for each system.
   2. System for individual's own locality.

ELEMENTS: Acreage, menaces (rats, wild animals), herbage, labor, sanitation.

TIME SCHEDULE: 90 minutes (two 45-minute periods).

EQUIPMENT: Charts, posters, blackboard, chalk, duster. (Posters to show losses caused by fox, other menaces, poor control of sanitation).

TEACHER'S PRESENTATION:

1. General class discussion:
   a. How much land is required for each system?
   b. Losses caused by fox, vermin, theft, poor sanitation.
2. Presentation of charts and posters.
3. Provision of opportunities for students to discuss system best suited to their home-farms.
4. Review of total discussion.
5. Blackboard summary.

STUDENT'S APPLICATION:

1. Discussion relative to acreage requirements and losses.
2. Explanation of charts and posters.
3. Selection of system most adaptable to their conditions.
4. Review.

FOLLOW-UP:

1. Oral questions.
2. Overall ability as demonstrated by discussion and selection of system.

ENTERPRISE: Poultry UNIT: Introduction

LESSON NO. 7 TITLE: Classification of the Chicken

NAME: _____ CLASS: _____ DATE: _____

OBJECTIVES:	Develop understanding of: 1. Terminology of classification of the chicken. 2. Major classes of chickens (fowl).
ELEMENTS:	Genus, species, class, breed, variety, strain, Asian, American, English, Mediterranian.
TIME SCHEDULE:	45 minutes.
EQUIPMENT:	Charts, posters, blackboard, chalk, duster.
SUPPLIES:	Chicken
TEACHER'S PRESENTATION:	1. Defining terminolog,. 2. Illustrating terminology and classification. 3. Discussion of terms. 4. Presentation of charts and posters of different classes of poultry. 5. Review of discussion. 6. Blackboard summary.
STUDENT'S APPLICATION:	1. Noting terminology. 2. Discussion of terminology. 3. Study of charts and posters for maximum understanding. 4. Review.
FOLLOW-UP:	1. Oral quiz. 2. Demonstration of understanding of charts and posters.

ENTERPRISE: Poultry UNIT: Class, Breed, Variety

LESSON NO. 8 TITLE: Breeds of Chickens

NAME: _____ CLASS: _____ DATE: _____

OBJECTIVES: Develop understanding of:

1. Identification of different breeds of chickens.
2. Recognition of characteristics of each breed.

ELEMENTS: Asian, American, English, Mediterranean breeds; body shape, color, shank, comb, production characteristics.

TIME SCHEDULE: 90 minutes (two 45-minute periods).

EQUIPMENT: Charts and posters dealing with breeds, blackboard, chalk, duster, bulletins.

SUPPLIES: As many breeds of chickens as possible.

TEACHER'S PRESENTATION:

1. Discussion of different breeds.
2. Presentation of charts and posters.
3. Distribution of one chart to each student.
4. Help students to understand charts and posters.
5. Explanation of characteristics of each breed.
6. Field trip to a good poultry farm.
7. Review discussion of characteristics.
8. Blackboard summary.

STUDENT'S APPLICATION:

1. Discussion.
2. Study of charts and posters for maximum understanding.
3. Noting characteristics.
4. Identification of different characteristics during field trip.
5. Review.

FOLLOW-UP:

1. Oral questions.
2. Demonstration of ability during field trip.

ENTERPRISE: Poultry UNIT: Class, Breed, Variety

LESSON NO. 9 TITLE: Types of Chickens

NAME: _____ CLASS: _____ DATE: _____

OBJECTIVES: Develop understanding of:

1. Different types of chickens.
2. Uses of different types in different segments of poultry industry.

ELEMENTS: Egg type, meat type, dual-purpose, game birds.

TIME SCHEDULE: 45 minutes.

EQUIPMENT: Charts of dual-purpose, meat, egg type chickens.

TEACHER'S PRESENTATION:

1. Discussion of different types of chickens.
2. Explanation of different types of chickens.
3. Illustration of characteristics of each type through charts and posters.
4. Adaptation of different types to different segments of poultry industry.
5. Review of types.
6. Blackboard summary.

STUDENT'S APPLICATION:

1. Discussion.
2. Listing names of different types.
3. Explaining charts and posters.
4. Review.

FOLLOW-UP:

1. Oral questions.
2. Demonstration of ability.

ENTERPRISE: Poultry UNIT: Terminology

LESSON NO. 10 TITLE: Identification of External Parts of Chicken

NAME: _____ CLASS: _____ DATE: _____

OBJECTIVES: Develop understanding of:

1. Identification of external parts of chicken.
2. Recognizing important external parts of chicken.

ELEMENTS: Drawing of chicken, labeling parts, identification of parts of a live chicken.

TIME SCHEDULE: 90 minutes (two 45-minute periods).

EQUIPMENT: Large sketch of chicken, table.

SUPPLIES: Chicken.

TEACHER'S PRESENTATION:

1. Have live chicken available.
2. Demonstrate how to hold it correctly.
3. Name external parts.
4. Draw a sketch of chicken on blackboard.
5. Label external parts.
6. Review of parts.
7. Give one outline sketch of chicken to each student for labeling parts.

STUDENT'S APPLICATION:

1. Holding chicken and naming parts.
2. Sketching an outline of body of chicken.
3. Labeling parts on sketch.
4. Review.

FOLLOW-UP:

1. Oral questions.
2. Demonstration of ability in identifying external parts of chicken.

ENTERPRISE: Agronomy UNIT: Introduction to Farm Seeds

LESSON NO. 1 TITLE: General Introduction to Farm Seeds

NAME: _____ CLASS: _____ DATE: _____

OBJECTIVES:	1. Develop understanding of importance of seeds to agriculture. 2. Develop maximum ability to understand characteristics of seeds.
ELEMENTS:	Importance and characteristics of seeds.
TIME SCHEDULE:	45 minutes.
EQUIPMENT:	Blackboard, chalk, duster
SUPPLIES:	Seeds of various kinds and of varying quality.
TEACHER'S PRESENTATION:	1. Distribution of seeds to each student. 2. Discussion of importance of seeds. 3. Explanation of characteristics of seeds in general. 4. Review.
STUDENT'S APPLICATION:	1. Participation in discussion. 2. Observation and study of characteristics of given seeds. 3. Review.
FOLLOW-UP:	1. Explanation of importance and characteristics. 2. Oral questions.

ENTERPRISE: Agronomy UNIT: Introduction to Farm Seeds

LESSON NO. 2 TITLE: Parts of Corn Seed (monocotyledon)

NAME:_____ CLASS:_____ DATE:_____

OBJECTIVES:	Develop understanding of: 1. Morphological structure of corn seeds. 2. Functions of seeds.
ELEMENTS:	Structure and functions of seeds.
TIME SCHEDULE:	45 minutes.
EQUIPMENT:	Blackboard, chalk, duster, large chart showing parts of corn seed.
SUPPLIES:	Corn seed.
TEACHER'S PRESENTATION:	1. Distribution of corn seed to each student. 2. Explanation of parts of corn seed through use of large chart and actual corn seed. 3. Observation and study of corn seed. 4. Discussion and explanation of functions of each part.
STUDENT'S APPLICATION:	1. Observation and study of corn seed. 2. Identification of parts of corn seed. 3. Review. 4. Individual explanation by each student to rest of class.
FOLLOW-UP:	1. Demonstration of ability to identify parts of seed, and to explain function of each part. 2. Oral questions.

ENTERPRISE: Agronomy UNIT: Introduction to Farm Seeds

LESSON NO. 3 TITLE: Parts of Soybean Seed (dicotyledon)

NAME: _____ CLASS: _____ DATE: _____

OBJECTIVES: Develop understanding of:

1. Morphological structure of soybean seed.
2. Functions of each part of soybean seed.

ELEMENTS: Morphological structure and functions of parts of soybean seed.

TIME SCHEDULE: 45 minutes.

EQUIPMENT: Chart showing parts of soybean seed, blackboard, chalk, duster.

SUPPLIES: Soybean seed.

TEACHER'S PRESENTATION:

1. Distribution of soybean seeds to each student.
2. Explanation of parts of soybean seed through:
   a. Chart showing actual parts.
   b. Actual seed.
   c. Blackboard sketches.
3. Discussion of functions of each part of soybean seed.
4. Review through study and observation of actual seed.

STUDENT'S APPLICATION:

1. Examination of actual soybean seed.
2. Identification of each part of seed.
3. Study and observation of each part plus review of function of each part.

FOLLOW-UP:

1. Ability to identify parts of soybean seed.
2. Ability to explain function of each part.
3. Oral questions.

ENTERPRISE: Agronomy UNIT: Introduction to Farm Seeds

LESSON NO. 4 TITLE: Seed Germination

NAME:_____ CLASS:_____ DATE:_____

OBJECTIVES:	Develop understanding of: 1. Seed germination. 2. How seed germinates.
ELEMENTS:	Germination and stages of germination.
TIME SCHEDULE:	90 minutes (two 45-minute periods).
EQUIPMENT:	Chart showing seed germination, seed tester (rag doll), blackboard, chalk, duster.
TEACHER'S PRESENTATION:	1. Distribution of germinating seeds. 2. Explanation of seed germination through use of: a. Chart showing seed germination. b. Actual seeds germinating. c. Blackboard sketches. 3. Discussion with students relative to germination. 4. Summary.
STUDENT'S APPLICATION:	1. Examination of distributed germinating seeds. 2. Participation in discussion. 3. Making notes on blackboard presentation.
FOLLOW-UP:	1. Oral questions. 2. Ability to explain different stages of germination.

ENTERPRISE: Agronomy UNIT: Introduction to Farm Seeds

LESSON NO. 5 TITLE: Conditions Necessary for Seed Germination

NAME:_____ CLASS:_____ DATE:_____

OBJECTIVES:	Develop understanding of: 1. Necessary conditions for seed germination. 2. Individual skills necessary to provide these conditions.
ELEMENTS:	Conditions for seed germination and skills necessary.
TIME SCHEDULE:	45 minutes.
EQUIPMENT:	Seed flat, blackboard, chalk, duster.
TEACHER'S PRESENTATION:	1. Explanation of conditions necessary for seed germination: a. Soils: fine, firm, and moist. b. Temperature. c. Seed that is expected to germinate. 2. Demonstration of use of seed flat.
STUDENT'S APPLICATION:	1. Discussion of conditions necessary for seed germination. 2. Preparation of seed flat for seeding. 3. Seeding of flat for later study and observation.
FOLLOW-UP:	1. Oral questions. 2. Demonstration of ability in preparing seed flat for seeding and actual seeding.

ENTERPRISE: Agronomy UNIT: Introduction to Farm Seeds

LESSON NO. 6 TITLE: Seed Germination Test by Rag-Doll Method

NAME:_____ CLASS:_____ DATE:_____

OBJECTIVES: Develop knowledge and skill necessary to:

1. Determine germination viability of a given lot of seeds.
2. Perform actual germination test.

ELEMENTS: Seed viability and germination testing.

TIME SCHEDULE: 45 minutes.

EQUIPMENT: Blackboard, chalk, duster.

SUPPLIES: Cloth, seeds for testing.

TEACHER'S PRESENTATION:

1. Explanation of importance of germination testing.
2. Demonstration of ragdoll method of testing by use of:
   a. Blackboard sketches.
   b. Initial phases of ragdoll test.
3. Review prior to testing by students.

STUDENT'S APPLICATION:

1. Study and observation of demonstrations.
2. Participation in class discussion.
3. Beginning actual individual testing as demonstrated.

FOLLOW-UP:

1. Oral questions.
2. Demonstration of ability in conducting a seed germination test.

ENTERPRISE: Agronomy UNIT: Introduction to Farm Seeds

LESSON NO. 7 TITLE: Seed Selection

NAME:_____ CLASS:_____ DATE:_____

OBJECTIVES:	Develop understanding of: 1. Importance of seed selection. 2. Skill necessary in seed selection.
ELEMENTS:	Necessary skills in seed selection.
TIME SCHEDULE:	45 minutes.
EQUIPMENT:	Seeds of various qualities, at least four small containers to place seeds of various qualities, blackboard, chalk, duster.
TEACHER'S PRESENTATION:	1. Distribution of selected good seeds to each student. 2. Explanation of characteristics of good seed. 3. Same as above except using poor seeds. 4. Set up seed selecting contests in small containers.
STUDENT'S APPLICATION:	1. Bring a sample of good seeds to class. 2. Study and observation of characteristics of good seed. 3. Explanation of poor seed characteristics, and what foreign materials to look for. 4. Practice (contests) in seed selection.
FOLLOW-UP:	1. Oral questions. 2. Demonstration of ability in explaining good and bad characteristics of seed. 3. Performance in seed selection contests.

ENTERPRISE: Agronomy UNIT: Introduction to Farm Seeds

LESSON NO. 8 TITLE: Seed Treatment

NAME: _____ CLASS: _____ DATE: _____

OBJECTIVES:	Develop understanding of: 1. Importance of seed treatment. 2. Necessary skills in seed treatment.
ELEMENTS:	Necessary skills in seed treatment.
TIME SCHEDULE:	45 minutes.
EQUIPMENT:	Blackboard, chalk, duster.
SUPPLIES:	Chemicals for seed treatment, seeds.
TEACHER'S PRESENTATION:	1. Discussion of importance of seed treatment. 2. Demonstration of seed treatment.
STUDENT'S APPLICATION:	1. Practice in seed treatment as demonstrated. 2. Practice in safety precautions.
FOLLOW-UP:	1. Oral questions. 2. Demonstration of individual ability in treating seeds.

ENTERPRISE: Agronomy UNIT: Introduction to Farm Seeds

LESSON NO. 9 TITLE: Seed Storage

NAME:_____ CLASS:_____ DATE:_____

OBJECTIVES: Develop understanding of:

1. Importance and need of seed storage.
2. Skills and conditions necessary for successful seed storage.

ELEMENTS: Importance, skills, and conditions for seed storage.

TIME SCHEDULE: 45 minutes.

EQUIPMENT: Seeds, some small containers that can be sealed, blackboard, chalk, duster.

TEACHER'S PRESENTATION:

1. Explanation of importance of storing seed.
2. Explanation of conditions necessary for successful seed storage.
3. Demonstration of storing seeds in small containers --probably vegetable seed for home-garden use.
4. Field trip to large seed storage facility.

STUDENT'S APPLICATION:

1. Participation in class discussion.
2. Making notes on necessary conditions for seed storage.
3. Discussion of enemies of seed during storage.
4. Practice in storage of a small quantity of seed.
5. Study and observation of a large seed storage facility during field trip.

FOLLOW-UP:

1. Oral questions.
2. Demonstration of ability and understanding in practice of storing a small quantity of seed.

ENTERPRISE: Agronomy UNIT: Introduction to Farm Seeds

LESSON NO. 10 TITLE: Adaptation of Different Varieties of Seeds to Different Soils

NAME:_____ CLASS:_____ DATE:_____

OBJECTIVES: Develop understanding of:

1. Seed variety adaptability to different soils.
2. Soil characteristics necessary for given varieties of seeds.

ELEMENTS: Variety adaptability to different soils.

TIME SCHEDULE: 45 minutes.

EQUIPMENT: Soil charts, various varieties of seed, blackboard, chalk, duster.

TEACHER'S PRESENTATION:

1. Discussion of different types of soils.
   a. Texture.
   b. Structure.
   c. Fertility.
   d. Surface and sub-surface drainage.
2. Explanation of why some varieties do well on some soils and poorly on other soils.
3. Visitations to farms using the same varieties of seed but with different soil characteristics.
4. Discussion of other environmental factors that affect varieties of seed.

STUDENT'S APPLICATION:

1. Participation in class discussion.
2. Making notes on different types of soils.
3. Study and observation of soils and varieties during field trip.

FOLLOW-UP:

1. Oral quiz.
2. Demonstration of knowledge by explanation of differences in appearance of the same variety of seed on different farms.

ENTERPRISE: Agronomy UNIT: Rice Production

LESSON NO. 1 TITLE: Importance of the Selection of Site for Rice

NAME: _____ CLASS: _____ DATE: _____

OBJECTIVES: Develop ability in:

1. Understanding importance of site selection in rice production.
2. Site selection for rice production.

ELEMENTS: Criteria necessary in rice site selection.

TIME SCHEDULE: 45 minutes.

EQUIPMENT: Rice, soil samples, blackboard, chalk, duster.

TEACHER'S PRESENTATION:

1. Explanation of importance of site.
2. Detailed explanation of necessary criteria for a desirable site.
   a. Climate.
   b. Soil texture and structure.
   c. Surface and sub-surface drainage.
   d. Irrigation facilities.
   e. Opportunities for timeliness.

STUDENT'S APPLICATION:

1. Examination of desirable soil samples.
2. Explanation of criteria essential for a good site.

FOLLOW-UP:

1. Oral questions.
2. Demonstration of understanding of criteria.

ENTERPRISE: Agronomy UNIT: Rice Production

LESSON NO. 2 TITLE: Land Preparation for Rice Nursery

NAME:_____ CLASS:_____ DATE:_____

OBJECTIVES:	Develop understanding of: 1. Necessary considerations in land preparation for rice nursery. 2. Skill necessary in preparing land for nursery.
ELEMENTS:	Plowing, irrigating, and recognition of optimum conditions.
TIME SCHEDULE:	90 minutes (two 45-minute periods).
EQUIPMENT:	Plow, rake, water, bullock.
TEACHER'S PRESENTATION:	1. Explanation of logical steps in land preparation: a. Plowing field with hoe, kodali, or bullock. b. Irrigating field to soften soil. c. Thoroughly mixing soil and water. d. Control of weeds, rice straw, and other organic matter which have been previously plowed under. e. Land well-puddled and leveled. 2. Demonstration in the field of all the above.
STUDENT'S APPLICATION:	1. Review of logical steps in land preparation. 2. Practice in each part of demonstration.
FOLLOW-UP:	1. Oral questions. 2. Demonstration of understanding of basic principles in field practice.

ENTERPRISE: Agronomy UNIT: Rice Production

LESSON NO. 3 TITLE: Seed Selection

NAME: _____ CLASS: _____ DATE: _____

OBJECTIVES: Develop understanding of:

1. Importance of seed selection.
2. Criteria for selection of good seed.

ELEMENTS: Importance and criteria of seed selection.

TIME SCHEDULE: 45 minutes.

EQUIPMENT: Seed, chalk, blackboard, duster.

TEACHER'S PRESENTATION:

1. Discussion of importance of seed selection in rice production.
2. Explanation of criteria of good seed selection:
   a. Insect- and disease-free seed.
   b. Importance of improved varieties.
   c. Importance of certified seed.
   d. Absence of dirt and other foreign materials.
3. Distribution of seeds to each student, requiring them to identify good and bad seeds and explain why.
4. Review of importance and criteria.

STUDENT'S APPLICATION:

1. Practice in seed selection.
2. Individual explanations to class: Criteria of good seed.

FOLLOW-UP:

1. Oral questions.
2. Supervised practice.
3. Demonstration of ability in actual seed selection.

ENTERPRISE: Agronomy UNIT: Rice Production

LESSON NO. 4 TITLE: Land Preparation for Transplanting

NAME:_____ CLASS:_____ DATE:_____

OBJECTIVES: Develop understanding of:

1. Importance of proper land preparation for transplanting rice.
2. Necessary skills for optimum performance in land preparation for transplanting rice.

ELEMENTS: Plowing, irrigating, and criteria of good land preparation for transplanting rice.

TIME SCHEDULE: 135 minutes (three 45-minute periods).

EQUIPMENT: Plow, rake, water, bullock.

TEACHER'S PRESENTATION:

1. Discussion of criteria for optimum land preparation:
   a. Plowing with bullock or kodali.
   b. Irrigating to soften the soil.
   c. Mixing mud and water thoroughly.
   d. Control of remains of previous crops.
   e. Puddling and leveling land.

STUDENT's APPLICATION:

1. Participation in class discussion.
2. Review of necessary criteria.
3. Individual practice of each part of demonstration.

FOLLOW-UP:

1. Oral questions.
2. Individual performance in field practice.

ENTERPRISE: Agronomy UNIT: Rice Production

LESSON NO. 5 TITLE: Transplanting Rice

NAME:_____ CLASS:_____ DATE:_____

OBJECTIVES: Develop understanding of:

1. Reasons and importance of transplanting.
2. Skills involved in actual transplanting.

ELEMENTS: Transplanting criteria.

TIME SCHEDULE: 90 minutes (two 45-minute periods).

EQUIPMENT: Rope, measuring tape, seedlings.

TEACHER'S PRESENTATION:
1. Explanation of necessity of transplanting rice.
2. Discussion of plant population:
   a. Number of seedlings per "hole."
   b. Distances row-to-row and hole-to-hole.
3. Review of soil conditions necessary.
4. Demonstration in field of preparing row, measuring, and transplanting.

STUDENT'S APPLICATION:
1. Discussion of key points in transplanting.
2. Field practice in transplanting, using methods and techniques demonstrated by teacher.

FOLLOW-UP:
1. Oral quiz.
2. Supervised practice.
3. Ability as demonstrated in practice.

ENTERPRISE: Agronomy UNIT: Rice Production

LESSON NO. 6 TITLE: Irrigation of Rice

NAME: _____ CLASS: _____ DATE: _____

OBJECTIVES: Develop understanding of:

1. Importance and techniques of rice irrigation.
2. Necessary skills of rice irrigation.

ELEMENTS: Irrigation--importance, types, and sources of water.

TIME SCHEDULE: 45 minutes.

EQUIPMENT: Water, water can, pumping system, syphon, hose or pipe.

TEACHER's PRESENTATION:

1. Explanation and discussion of importance of rice irrigation.
2. Explanation of types of irrigation for rice:
   a. Top.
   b. Flood.
   c. Strip.
   d. Border.
3. Explain why furrow irrigation is not suitable for rice.
4. Discuss sources of water:
   a. Canal.
   b. Flood.
   c. Tank or pond.
   d. Ground water.
5. Demonstration of flood irrigation.

STUDENT'S APPLICATION:

1. Practice in flood irrigation as demonstrated.
2. Review of other methods.

FOLLOW-UP:

1. Supervised practice.
2. Individual performance during supervised practice.
3. Oral questions.

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ENTERPRISE: Agronomy UNIT: Rice Production

LESSON NO. 7 TITLE: Fertilizing Rice

NAME:_____ CLASS:_____ DATE:_____

OBJECTIVE: Develop understanding of:

1. Advantages of fertilizing rice.
2. Use of fertilizers in rice production.

ELEMENTS: Timeliness, methods of application, rates of application, and types of fertilizers for rice.

TIME SCHEDULE: 90 minutes (two 45-minute periods).

EQUIPMENT: Fertilizer (N, P, and K), basket, weighing device.

TEACHER'S PRESENTATION:

1. Explanation and discussion of advantages of fertilizing rice.
2. Explanation of fertilizer ratios (1-1-1, 10-10-10, 5-4-3).
3. Explain methods of application.
4. Discuss rates of application.
5. Explain timeliness of fertilizing rice.
6. Demonstration of actual application in the field.

STUDENT'S APPLICATION:

1. Participate in discussion of timeliness, method, and rate of fertilizer application, and discuss types of fertilizers available.
2. Make notes on all key points.
3. Field practice in use of ammonium sulfate.

FOLLOW-UP:

1. Oral questions.
2. Supervised practice.
3. Ability to demonstrate necessary knowledge of use of fertilizers in rice production.

ENTERPRISE: Agronomy UNIT: Rice Production

LESSON NO. 8 TITLE: Weed Control in Rice

NAME: _____ CLASS: _____ DATE: _____

OBJECTIVES: Develop understanding of:

1. Importance and necessity of weed control in rice.
2. Knowledge and skills necessary in weed control in rice.

ELEMENTS: Weed control by mechanical methods, or weedicides.

TIME SCHEDULE: 90 minutes (two 45-minute periods).

EQUIPMENT: Weed control chemicals, hoe, khurip, kutte, sickle, paddy weeder.

TEACHER'S PRESENTATION:

1. Discussion of importance and necessity of weed control.
2. Explanation of methods of weed control.
3. Give examples of different methods of weed control.
4. Demonstrate in the field:
   a. Chemical method.
   b. Mechanical method.
   c. Mere "pulling" method.

STUDENT'S APPLICATION:

1. Make notes of different methods and explanation of each.
2. Individual practice in the field of:
   a. Chemical method.
   b. At least one mechanical method.

FOLLOW-UP:

1. Oral questions.
2. Supervision and examination of each individual's performance in the field.

ENTERPRISE: Agronomy UNIT: Rice Production

LESSON NO. 9 TITLE: Insect and Disease Control in Rice

NAME:_____ CLASS:_____ DATE:_____

OBJECTIVES: Develop understanding of:

1. Importance and necessity of insect and disease control in rice.
2. Necessary skills in insect and disease control in rice.

ELEMENTS: Spraying and dusting.

TIME SCHEDULE: 45 minutes.

EQUIPMENT: Appropriate chemicals, sprayer, water.

TEACHER'S PRESENTATION:

1. Discussion of necessity and advantages of insect and disease control in rice.
2. Discussion of major insects and diseases of rice with charts and posters.
3. Explain methods of control.
4. Demonstration of:
   a. Mixing chemicals.
   b. Using sprayer.
   c. Safety precautions.

STUDENT'S APPLICATION:

1. Make notes of key points of discussion.
2. Practice in the field techniques demonstrated in classroom and field.

FOLLOW-UP:

1. Oral questions.
2. Supervision and examination of each individual's performance and ability in the field.

ENTERPRISE: Agronomy UNIT: Rice Production

LESSON NO. 10 TITLE: Harvesting Rice

NAME: _____ CLASS: _____ DATE: _____

OBJECTIVES: Develop performance of:

1. Importance and timeliness of harvesting.
2. Necessary skills of harvesting rice.

ELEMENTS: Recognition of maturity, consideration of timeliness, and methods of harvesting.

TIME SCHEDULE: 90 minutes (two 45-minute periods).

EQUIPMENT: Hand tools, sickle, harvestors.

TEACHER'S PRESENTATION:
1. Discussion relative to rice maturity.
2. Explain importance of timeliness of harvesting.
3. Explain various methods of harvesting.
4. Demonstration in the field how to recognize full maturity and most adaptable harvesting procedures.

STUDENT'S APPLICATION:
1. Participation in class discussion.
2. Recording key points for future reference and study.
3. Field practice as demonstrated.

FOLLOW-UP:
1. Oral questions.
2. Demonstration of ability in recognizing maturity and skill in actual harvesting.

ENTERPRISE: Horticulture UNIT: Cauliflower Production

LESSON NO. 1 TITLE: Importance of Cauliflower and Site Selection

NAME: _____ CLASS: _____ DATE: _____

OBJECTIVES: Develop understanding of:

1. Importance of cauliflower.
2. Importance of site for cauliflower production.

ELEMENTS: Importance of cauliflower and criteria for site selection.

TIME SCHEDULE: 45 minutes.

EQUIPMENT: Cauliflower, blackboard, chalk, eraser.

TEACHER'S PRESENTATION:

1. Show a good cauliflower to class.
2. Explain and discuss its utility as:
   a. Vegetable, salad, or pickle.
   b. Sources of energy, minerals, and vitamins.
3. Explain and discuss the necessary criteria for site selection:
   a. Well drained--surface and sub-surface.
   b. Fertility requirements.
   c. Soil texture and structure.
   d. Open place.

STUDENT'S APPLICATION:

1. Observe and study cauliflower.
2. Relate its uses, explain energy, minerals, and vitamins relative to the cauliflower.
3. Relate the criteria necessary for a good site.

FOLLOW-UP:

1. Oral questions:
   a. What are the uses of cauliflower?
   b. Can you grow it in a muddy field?
   c. Can you grow it in a shady place?

ENTERPRISE: Horticulture UNIT: Cauliflower Production

LESSON NO. 2 TITLE: Seedbed Preparation

NAME: _____ CLASS: _____ DATE: _____

OBJECTIVES: Develop understanding of:

1. Importance of seedbed preparation.
2. Necessary skills for optimum production:
   a. Digging plot.
   b. Breaking clods.
   c. Raking and leveling.

ELEMENTS: Importance of seedbed preparation.

TIME SCHEDULE: 90 minutes (two 45-minute periods).

EQUIPMENT: Kodali, spade, kuto, rake, dalantho.

TEACHER'S PRESENTATION:

1. Explain importance of a good seedbed (fine, firm, moist.).
2. Explain and demonstrate methods of digging.
3. Explain and demonstrate methods of breaking clods.
4. Explain and demonstrate methods of raking and leveling.

STUDENT'S APPLICATION:

1. Relate importance of seedbed.
2. Practice digging, breaking clods, raking, leveling.

FOLLOW-UP:

1. Oral questions:
   a. Why do you dig the soil?
   b. How deep do you dig?
   c. Why do you break the clods?
   d. Why do you rake and level the field?
2. Field demonstration of abilities.

ENTERPRISE: Horticulture UNIT: Cauliflower Production

LESSON NO. 3 TITLE: Seed Selection and Seeding of Cauliflower

NAME: _____ CLASS: _____ DATE: _____

OBJECTIVES: Develop understanding of:

1. Importance of seed selection.
2. Necessary criteria of good seeds.
3. Proper method of seeding.
4. Timeliness, spacing, depth, and methods of seeding (drill and broadcast).

ELEMENTS: Importance of seed selection, methods of seeding, techniques of seeding.

TIME SCHEDULE: 90 minutes (two 45-minute periods).

EQUIPMENT: Cauliflower seed, blackboard, chalk, thread, sticks, measuring device, kuto, hoe.

TEACHER'S PRESENTATION:

1. Have various varieties of seed in classroom.
2. Explain and discuss:
   a. Importance of seed selection.
   b. Characteristics of good seed.
   c. Timeliness of seeding.
   d. Space and depth of seeding.
   e. Method of seeding.
3. Demonstration in field.

STUDENT'S APPLICATION:

1. Observe and study good varieties of seed.
2. Review and explain importance of good seed, characteristics of good seed, timeliness of seeding, space and depth of seeding, and methods of seeding.
3. Practice in field as demonstrated.

FOLLOW-UP:

1. Oral questions.
2. Demonstration of knowledge and practical ability in the field.

ENTERPRISE: Horticulture UNIT: Cauliflower Production

LESSON NO. 4 TITLE: Mulching Cauliflower

NAME:_____ CLASS:_____ DATE:_____

OBJECTIVES: Develop understanding of:

1. Importance of mulching.
2. Necessary skills and materials for mulching.

ELEMENTS: Importance, methods, and materials for mulching cauliflower.

TIME SCHEDULE: 45 minutes.

EQUIPMENT: Straw, blackboard, chalk, eraser.

TEACHER'S PRESENTATION:

1. Have straw available in classroom.
2. Explain and discuss importance of mulching.
3. Take students to field and demonstrate techniques and procedures of mulching.

STUDENT'S APPLICATION:

1. Review by:
   a. Explaining importance of mulching.
   b. Explaining different materials for mulching.
2. Practice in field as demonstrated.

FOLLOW-UP:

1. Oral questions:
   a. Why do you mulch cauliflower?
   b. What are the advantages of mulching?
2. Demonstration of ability and understanding in the field.

ENTERPRISE: Horticulture UNIT: Cauliflower Production

LESSON NO. 5 TITLE: Irrigation of Cauliflower

NAME:_____ CLASS:_____ DATE:_____

OBJECTIVES: Develop understanding of:

1. Importance of irrigation of cauliflower.
2. Different types of irrigation.

ELEMENTS: Importance of irrigation and types of irrigation--top, side, flood, and strip.

SCHEDULE: 90 minutes (two 45-minute periods).

EQUIPMENT: Water, water can, blackboard, chalk, eraser.

TEACHER'S PRESENTATION:

1. Illustrate action of water by use of water can.
2. Explain and discuss needs and advantages of irrigation.
3. Explain and demonstrate types of irrigation in the field:
   a. Top.
   b. Side.
   c. Flood.
   d. Strip.

STUDENT'S APPLICATION:

1. Review by students through their explanation of:
   a. Top irrigation.
   b. Side irrigation.
   c. Flood irrigation.
   d. Strip irrigation.
2. Practice of each type in the field as demonstrated.

FOLLOW-UP:

1. Oral questions.
2. Demonstration of knowledge and ability in field practice.

ENTERPRISE: Horticulture UNIT: Cauliflower Production

LESSON NO. 6 TITLE: Transplanting Cauliflower

NAME:_____ CLASS:_____ DATE:_____

OBJECTIVES: Develop understanding of:

1. Importance and necessity of transplanting cauliflower.
2. Optimum skill development in pulling the transplant.
3. Optimum skill development in transplanting in the field at proper depth and distance.

ELEMENTS: Importance and methods.

TIME SCHEDULE: 90 minutes (two 45-minute periods).

EQUIPMENT: Transplanting trowel, thread, measuring device, sticks, kuto.

TEACHER'S PRESENTATION:

1. Explain and discuss reasons for transplanting.
2. Explain and demonstrate pulling the transplant.
3. Explain and demonstrate spacing procedures.
4. Explain and demonstrate actual transplanting.

STUDENT'S APPLICATION:

1. Student explains reasons for transplanting.
2. Student explains and demonstrates pulling the transplant.
3. Student explains and demonstrates spacing procedures.
4. Student explains and demonstrates actual transplanting.

FOLLOW-UP:

1. Oral questions.
2. Demonstration of ability in field work.

ENTERPRISE: Horticulture UNIT: Cauliflower Production

LESSON NO. 7 TITLE: HOeing and Weeding

NAME:_____ CLASS. _____ DATE:_____

OBJECTIVES: Develop understanding of:

1. Importance, timeliness, and methods of hoeing and weeding.
2. Mechanical abilities necessary for hoeing and weeding.

ELEMENTS: Importance, timeliness, methods of hoeing and weeding.

TIME SCHEDULE: 45 minutes.

EQUIPMENT: Hoe, hand hoe, hand fork, kodali.

TEACHER'S PRESENTATION:
1. Discussion of importance of hoeing and weeding.
2. Demonstration of proper method of hoeing and weeding.
3. Discussion of time and care necessary.

STUDENT'S APPLICATION:
1. Student explains importance of hoeing and weeding.
2. Student demonstrates hoeing and weeding.
3. Student explains time and care of weeding.

FOLLOW-UP:
1. Oral questions.
2. Demonstration of ability in field work.

ENTERPRISE: Horticulture UNIT: Cauliflower Production

LESSON NO. 8 TITLE: Application of Fertilizers

NAME:_____ CLASS:_____ DATE:_____

OBJECTIVES: Develop understanding of:

1. Names of essential plant food nutrients.
2. More important nutrient carriers.
3. Timeliness, amount, placement, method of fertilizer application (side-dressing and broadcasting).

ELEMENTS: Importance, 16 plant nutrients, carriers, placement, method of application.

TIME SCHEDULE: 135 minutes (three 45-minute periods).

EQUIPMENT: Fertilizers, hoe or kodali, water, blackboard, chalk, duster.

TEACHER'S PRESENTATION:

1. Explain and discuss importance of fertilizer.
2. List 16 plant nutrients.
3. Explain and discuss carriers of each nutrient.
4. Explain and demonstrate methods of application --side-dressing and broadcasting in the field.
5. Explain and discuss timeliness, quantity, and placement.

STUDENT'S APPLICATION:

1. Student explains importance of fertilizers.
2. Student makes note of 16 essential plant food nutrients.
3. Student explains and discusses fertilizers (carriers).
4. Student explains and demonstrates methods of application.
5. Student explains and discusses timeliness and amount to use.

FOLLOW-UP:

1. Oral questions.
2. Written exam.
3. Demonstration of ability in field work.

ENTERPRISE: Horticulture UNIT: Cauliflower Production

LESSON NO. 9 TITLE: Insect and Disease Control

NAME:_____ CLASS:_____ DATE:_____

OBJECTIVES: Develop understanding of:

1. Importance and necessity of insect and disease control.
2. Insects and diseases.
3. Methods of control.
4. Names and types of insecticides.

ELEMENTS: Importance, insects and diseases, methods of control, knowledge of insecticides.

TIME SCHEDULE: 90 minutes (two 45-minute periods).

EQUIPMENT: Plants damaged by insects and/or diseases, charts, sprayer, insecticides, blackboard, chalk, eraser.

TEACHER'S PRESENTATION:

1. Explain importance of insect and disease control.
2. List names of insects and diseases that affect cauliflower.
3. Explain control of various insects and diseases--spraying, dusting, or prevention.
4. Demonstrate spraying and/or dusting in the field.

STUDENT'S APPLICATION:

1. Review of importance of insects and diseases.
2. Make note of most common insects and diseases that affect cauliflower.
3. Explain various methods of control.
4. Practice spraying and/or dusting as demonstrated.

FOLLOW-UP:

1. Oral questions.
2. Demonstration of ability in field work.

LESSON PLANS FOR FARM SHOP AND FARM POWER AND MACHINERY

The lesson plans on the following pages, developed by Mr. Dwight Mobley, Teach Corps Specialist in Agricultural Machanics, are selected and representative materials for introducing farm shop and farm power and machinery. These selections are not to be taken as the total plans necessary for a complete unit or course. They may be used as actual lesson plans, as well as guides in developing the total number of plans required for the entire unit or course.

UNIT: Farm Shopwork

PROBLEM AREA: Using Basic Woodworking Tools

OBJECTIVE: Develop ability to:

1. Become acquainted with various hand tools and how to use them properly.
2. Match tool with job.
3. Appreciate functional and well-conditioned tools.
4. Become safety-minded concerning hazardous wood tools.

THINGS TO BE LEARNED	CLASSROOM ACTIVITIES
A. Measure and mark wood.	Show film--ABC's of Hand Tools
1. Reading rule.	Have on table: Rule, folding rule, steel tape, square, combination square, marking gauge.
2. Measuring with rule.	
3. Using combination square.	Reference: Shopwork on the Farm, by Jones, pp. 43-57
4. Using steel square. a. Laying off angles. b. Squaring corners of frames and forms. c. Testing and correcting square. d. Using tables on square.	Assign reading material. Discuss use of each tool; demonstrate its proper use.
5. Using adjustable bevel square.	Allow each student to mark off various dimensions given to him, using different equipment--find center of board, etc.
6. Using marking gauge.	(Refer to Job Information Sheet)
7. Using chalk line.	
8. Using plumb bob.	
9. Using level.	
10. Measuring width of openings.	
11. Testing level for accuracy.	

(Continued on next page)

Using Basic Woodworking Tools (continued)

THINGS TO BE LEARNED	CLASSROOM ACTIVITIES
12. Using compass.	
B. Saw lumber.	Show different types and sizes of saws and explain their uses and characteristics.
1. Types of hand saws. a. Cross-cut saw. b. Rip saw. c. Back saw. d. Compass saw. e. Coping saw.	Reference: Shopwork on the Farm. by Jones, pp. 58-64. Give reading assignment; discuss.
2. Use of cross-cut hand saw. a. Placing and holding board. b. Starting cut: grip and body position. c. Type and angle of stroke. d. Procedure for finishing cut.	Demonstrate use of each type of saw. Allow each student to use square and pencil and various saws to practice their use. (Refer to Job Operation Sheet)
3. Use of rip hand saw. a. Placing and holding board. b. Starting cut: grip and body position.	
4. Using back saw. a. Holding board. b. Starting saw. c. Type and angle of stroke.	Discuss use of back saw with miter box.
5. Using compass saw. a. Holding board. b. Starting saw. c. Sawing curved lines.	
C. Plane wood.	Reference: Shopwork on the Farm by Jones, pp. 65-79.
1. Different types of planes. a. Jack plane. b. Smooth plane.	Show types of planes and demonstrate how each is used.

(Continued on next page)

Using Basic Woodworking Tools (Continued)

THINGS TO BE LEARNED	CLASSROOM ACTIVITIES
c. Jointer plane. d. Block plane.	Assign reading material and discuss.
2. Assembling plane.	Allow students to practice using each type of plane in proper manner. (Refer to Job Operation Sheet)
3. Adjusting plane for: a. Depth of cut. b. Lateral adjustment. c. Lever cap screw adjustment.	Demonstrate procedure for disassembly and assembly of plane.
4. Use of plane. a. Holding board properly. b. Proper grip and position. c. Planing board--direction of stroke, forward and return stroke technique.	
5. Precautions to take. a. Dullness, nicks, or high corners of blade. b. Incorrect adjustment. c. Nails in boards. d. At rest position.	
D. Sand wood surface.	Display selection of sanding materials.
1. Selecting kinds and grades of sanding materials. 2. Methods of holding.	Demonstrate how to use.
3. Sanding flat surfaces.	Have students practice using materials.
4. Sanding round surfaces and irregular edges.	
5. Precautions to take: a. Using with grain. b. Using as final smoothing operation.	Reference: Shopwork on the Farm, by Jones, pp. 80-81.

(Continued on next page)

Using Basic Woodworking Tools (continued)

THINGS TO BE LEARNED	CLASSROOM ACTIVITIES
E. Use of wood chisels.	Reference: Shopwork on the Farm, by Jones, pp. 81-91
1. Selecting chisel; tang and socket types, common size, type of handle, length, etc.	Assign reading material.
2. Keeping chisel sharp.	Discuss use of chisel.
3. Chiseling with grain.	Allow students to practice using chisel properly.
4. Chiseling across grain.	(Refer to Job Operation Sheet)
5. Using mallet.	
6. Making dados and rabbets.	
F. Bore and drill holes in wood.	Reference: Shopwork on the Farm, by Jones, pp. 91-98.
1. Types of boring tools. a. Braces: Ratchet and non-ratcheting types. b. Hand drill. c. Automatic push drill. d. Electric hand drill. e. Drill press.	Assign reading material. Discuss advantages and disadvantages of each type. Demonstrate proper use of each type of drill.
2. Boring with auger bit. a. Selecting correct size. b. Starting auger bit. c. Boring to depth.	Caution against use of auger bit in power drill.
3. Using twist drills. a. With hand drill. b. Electric hand drill. c. Electric drill press.	Point out how size is determined and designated on drill bit.
4. Using power bits.	

(Continued on next page)

Using Basic Woodworking Tools (continued)

THINGS TO BE LEARNED	CLASSROOM ACTIVITIES
G. Fasten wood with nails.	Referece: Shopwork on the Farm, by Jones, pp. 98-104.
1. Sizes and types of hammers (Bell faced, plain faced, curved claw, ripping).	Assign reading material.
2. Driving nails with hammer.	Show class different types of hammers used and characteristics of each.
3. Pulling or removing nails.	Show examples of correct and incorrect methods of mailing.
4. Clinching nails.	
5. Setting nails.	Show students various kinds and sizes of nails and discuss proper use of each.
6. Draw nailing.	
7. Toenailing.	
8. Placement of nails for strength and to prevent splitting.	
9. Selecting correct kind of nail.	
H. Fasten wood with crews.	Reference: Shopwork on the Farm, by Jones, pp. 104-111.
1. Selecting screws for particular job. a. Proper length and diameter. b. Proper head. c. Proper finish.	Use chart or samples of various screws to show differences and names of parts of screws.
2. Determine size of hole to drill.	Discuss what determines size of hole to drill and depth to drill.
3. Selecting proper type and size of screwdriver for job.	Discuss differences in screwdrivers: Common, Phillips, and off-set.
4. Using screwdriver properly and safely.	Allow students to fasten two pieces of scrap material together with screws. Remove screws and return to box.

(Continued on next page)

Using Basic Woodworking Tools (continued)

THINGS TO BE LEARNED	CLASSROOM ACTIVITIES
I. Fasten wood with glue.	Hand out to students chart showing synthetic glue characteristics and explanatory materials.
1. Kinds of glue.	
2. Application of glue.	Discuss use of glues in farm construction.
3. Using clamps properly.	
4. Doweling.	
J. Use rasp and file for irregular surfaces.	Reference: Shopwork on the Farm, by Jones, pp. 115-116.
	Assign reading material.
	Demonstrate use of rasp for roughing and coarse file for finishing.
K. Construct farm shop project using woodworking tools and skills.	Refer to Job Operation Sheet.

JOB OPERATION SHEET

UNIT: Using Basic Woodworking Tools

JOB: Measuring and marking Wood

What to Do	How to Do It
A. Reading a rule.	1. Graduation lines on a rule are varied in length for quick and accurate reading. 2. 1 inch lines are longest, 1/2 inch lines a little shorter, 1/4 inch lines still shorter, etc.
B. Measuring with rule.	1. To measure distance between two points, place end of rule even with one point, and read measurement on rule at other point. 2. Mark points on wood with a knife or pencil when laying out measurements.
C. Marking wood.	1. To locate and mark middle of board, place rule across board at an angle so that major divisions coincide with edges of board; mark midway between these two major divisions. 2. Use pencil and straight-edge to mark line between two points. 3. Angles can be marked by using square, or bevel; marking gauge and combination square may be used for gauging.

JOB OPERATION SHEET

UNIT: Using Basic Woodworking Tools

JOB: Using Hand Saws

What to Do	How to Do It
A. Holding saw.	1. Grasp handle firmly. 2. Extend forefinger along side of handle, not through handle, with other fingers.
B. Sawing position.	1. Stand back from work a little and in position so that a line across chest and shoulders is at an angle of 45 to 60 degrees with line of sawing. 2. Place saw arm, elbow, shoulder, and eye all in same vertical plane.
C. Holding work.	1. Wood should be held securely so that it does not move. 2. Hold it in vise or clamp; or hold firmly with hand and knee.
D. Starting crosscut saw.	1. Grasp far edge of board, using thumb to guide saw while starting. 2. Start with two-three back strokes, holding blade square with board. 3. Start sawcut, or kerf, beside line in waste material, leaving line.
E. Sawing off a board.	1. Saw with long, easy strokes and light pressure. 2. Hold saw at 45 degree angle with board. 3. When finishing cut, to avoid splintering, hold up outer end of board and use short and easy strokes.

JOB OPERATION SHEET

UNIT: Using Basic Woodworking Tools

JOB: Using a Plane

What to Do	How to Do It
A. Adjusting plane.	1. Set plane to cut about 1/64 inch by adjusting knurled nut just in front of handle. 2. Check adjustment by turning plane upside down and note that blade shows through evenly and just about the thickness of a sheet of paper.
B. Holding plane.	1. Grasp handle with one hand and knob with other, palm on top of knob. 2. Stand beside work, with one foot slightly ahead. 3. As plane is pushed forward, shift weight to forward foot. 4. Keep forearm in line with plane.
C. Securing work.	1. Hold wood firmly so that it does not move. 2. Either hold it in a vise, clamp it, or hold it against a stopper on bench top.
D. Planing.	1. Plane with grain of board. 2. To start plane, press down firmly on knob and push with handle. 3. As plane passes over opposite end of work, shift pressure to handle. 4. Continue this process until work is smooth and true. 5. Planing can be done on edge, end, or surface. Be certain blade is sharp and properly adjusted. Check frequently with square or straight-edge for trueness.

JOB OPERATION SHEET

UNIT: Using Basic Woodworking Tools

JOB: Project--Making a Nail Box

What to Do	How to Do It
A. Cut all pieces to correct size.	1. Use dimensions shown on drawing. 2. Measure accurately and draw lines using square. 3. Cut boards squarely with hand saw, remembering to cut on waste side of marked line.
B. Square all boards.	1. Use smooth plane for edges, and plane with grain. 2. Take precautions not to splinter ends when planing with block plane.
C. Cut Finger slot in handle.	1. Locate center-line for slot. 2. Mark accurately for length. 3. Use proper sized wood auger bit. Use correct procedure to prevent splintering of wood. 4. Remove waste wood between holes with keyhole saw. 5. Complete removal and square edges with wood rasp.
D. Cut taper in handle board.	1. Mark handle so that taper will meet top-edge of each end. 2. Cut along line with crosscut saw, being careful not to split board.
E. Sand all pieces.	1. Sand with grain. 2. Remove all scratches, marks, etc.

(Continued on next page)

JOB OPERATION SHEET

UNIT: Using Basic Woodworking Tools

JOB: Project--Making a Nail Box (Continued)

What to Do	How to Do It
F. Assemble pieces.	1. Use 1-1/2" or 2" No. 8 flathead wood screw or 2" common nail and glue. 2. Attach sides to bottom first, and then fit end pieces to sides and bottom. 3. Attach partitions to handle. 4. Fit handle and partitions into box and fasten to sides, ends, and bottom.
G. Present to instructor for evaluation.	1. Student's name should be written on underside of completed nail box.

UNIT: Farm Shopwork

PROBLEM AREA: Soldering and Sheet Metal Work

OBJECTIVE: Develop ability to:

1. Select and use properly tools, equipment, materials for working with sheet metal.
2. Measure, shape, join sheet metal.

THINGS TO BE LEARNED	CLASSROOM ACTIVITIES
A. An appreciation of importance and value of sheet metal work. 1. What soldering is and how it is done. 2. Repair jobs that may be done by soldering.	Prepare list of different equipment repairs that can be done with soldering process. With diagrams and charts, show how soldering process works, how heat range of soldering compares with welding and brazing.
B. Ability to select tools, materials, equipment for soldering. 1. Soldering coppers. a. Kinds, sizes, uses of common coppers. b. Electric soldering irons: Types and sizes. c. Soldering irons used with arc welder. 2. Heating equipment. a. Blow torch and gas furnace: Types and sizes. b. Acetylene torch, propane torch, or forge. 3. Solder. a. Forms of solder: Bar, wire, acids, rosin core. b. Composition of solder. c. Kinds of solder. 4. Flumes. a. Kinds of flumes, their uses and characteristics: corrosive,	Have tools and equipment where students can see and handle during discussion of each. Demonstrate operation of gasoline and kerosene blowtorches. (see Job Operation Sheet) Show methods for heating more than one copper at a time with blow torch.

(Continued on next page)

Soldering and Sheet Metal Work (continued)

THINGS TO BE LEARNED	CLASSROOM ACTIVITIES
non-corrosive, acids, salts, pastes. 5. Other equipment: Rivet sets, tin snips, sheet metal screws.	
C. Know metals that can be soldered. 1. Ease of soldering sheet iron, galvanized sheet iron, tin, lead, aluminum, copper, brass, others.	Show soldered projects of different kinds of metal.
D. Tinning a soldering copper. 1. Purpose: To remove oxides, making heat flow readily. 2. Cleaning and shaping. 3. Applying coat of solder.	Demonstrate technique of tinning copper. Allow students to try their ability. (See Job Operation Sheet)
E. Soldering holes in sheet metal.	Show projects that have been successfully completed to students. (See Job Operation Sheet)
F. Soldering seams. 1. Cleaning and fluxing. 2. Running solder.	(See Job Operation Sheet)
G. Riveting sheet metal objects. 1. Selecting rivets for their length, diameter. 2. Punching, drilling holes. 3. Heading rivet.	(See Job Operation Sheet)
H. Cutting sheet metal, using different tools and methods. 1. Cold chisel. 2. Hack saw. 3. Straight shears. 4. Others.	Provide soldering exercise that will require use of as many cutting tools and methods as possible. (See Job Operation Sheet)
I. Perform sheet metal exercise and make repairs on equipment related to student's course of study (horticulture, agronomy, animal science, poultry, etc.).	Encourage students to bring in damaged sheet metal equipment and repair it.

REFERENCES:

Jones, Mack M., Shopwork on the Farm, Chapter 11.
Phipps, L. J., Mechanics in Agriculture, Chapters 17 and 18.

JOB OPERATION SHEET

UNIT: Soldering and Sheet Metal Work

JOB: Operating a Gasoline Blowtorch

Materials Needed:

1. Blowtorch.
2. White gasoline.
3. Clean rags.
4. Matches.

What to Do	How to Do It
A. Fill fuel chamber.	1. Wipe dust, etc., from funnel, tank filler hole, plug. 2. Use strained white gasoline (not leaded), fill two-thirds full. 3. Wipe spilled gas from tank and table. 4. Replace and tighten plug.
B. Pump air into chamber.	1. Ten to 12 strokes is sufficient if pump is in good condition.
C. Fill priming cup.	1. Hold palm of hand over end of burner. 2. Open needle valve, tip torch so gas will run into priming cup. 3. Fill cup almost full. Close needle valve and wipe off spilled gasoline.
D. Generate torch.	1. Light gasoline in cup, allowing it to burn until cup is almost empty. 2. Shield cup from air currents.
E. Light torch.	1. Open gas needle valve one-half turn or more. 2. Do not have torch pointing at anyone. 3. If torch does not light, use match through holes in side of burner. 4. If torch pulsates, squirt stream of gasoline, or does not adjust to blue flame or colorless flame, generate torch again.
F. Turn off torch.	1. Turn off gas valve just enough to stop flow of gas, and no tighter.
G. Observe safety precautions at all times.	1. Avoid spilling gasoline when filling blowtorch. Wipe off torch before attempting to light.

JOB OPERATION SHEET

UNIT: Soldering and Sheet Metal Work

JOB: Cleaning and Tinning a Soldering Copper

MATERIALS NEEDED:

1. Dirty soldering copper
2. Machinists vise.
3. Metal file.
4. Blowtorch.
5. Sal ammoniac brick.
6. Solder.
7. Clean rag.

What to Do	How to Do It
A. Select soldering copper that that needs to be cleaned.	1. Copper may be pitted and rough from over-heating.
B. Hold copper in vise to p-event slipping.	1. Use machinist's vise on table.
C. Using metal file, file faces of the point.	1. Faces must be smooth and flat to provide good heating surface.
D. After cleaning, tin faces of point of soldering copper.	1. Heat copper until it will melt solder readily. 2. Rub faces of copper on brick of sal ammoniac or dip it into flux solution such as zinc chloride. 3. Apply small amount of solder to copper; wipe solder with damp rag to spread it. 4. Continue doing this until all faces of point are tinned or covered with solder.

JOB OPERATION SHEET

UNIT: Soldering and Sheet Metal Work

JOB: Cutting Sheet Metal

MATERIALS NEEDED:

1. Sheet metal.
2. Tinner's snips.
3. Cold chisel.
4. Angle iron (2 pcs., 12" long).

What to Do	How to Do It
A. Cut with tinner's snips.	1. Mark line on metal to be cut, using scratch awl. 2. Open blades wide, insert metal all the way back in throat. 3. Keep cutting edge of upper blade exactly over line to be cut. 4. Squeeze handles together. 5. It is usually best not to cut all the way out to tips of blades.
B. Cut with cold chisel.	1. Clamp heavy sheet metal in jaws of vise or between angle irons held in vise. 2. Clamp metal with line of cutting just even with top of vise jaws or angle iron. 3. Keep bevel of cold chisel flat against vise jaw or angle iron. 4. Hold chisel at angle to metal to give shear cut. 5. Use sharp chisel.

JOB OPERATION SHEET

UNIT: Soldering and Sheet Metal Work

JOB: Riveting Sheet Metal

MATERIALS NEEDED:

1. Scrap pieces of sheet metal.
2. Rivets.
3. Rivet set.
4. Medium weight hammer.
5. Center punch.
6. Solid punch.
7. Drill.

What to Do	How to Do It
A. Select rivet	1. Soft steel rivets should be 1/8" to 1/4" longer than thickness of metals to be riveted.
B. Prepare metal.	1. Holes may be drilled or punched. 2. Use center punch and drill of correct size to fit rivet. 3. Or, use a solid punch of same size as rivet over end-grain wood or block of lead. 4. Where accuracy is not too important, use rivet to cut its own hole.
C. Hammer rivet in place.	1. Insert rivet into drilled or punched hole. 2. Use rivet set to drive metal down over the rivet. 3. Hammer down end with one or two blows of flat face of hammer. 4. Finish forming head on rivet with cupped-out hollow of rivet set for neat appearance. 5. If rivet should start to bend when hammered, remove it and replace with another rivet.

JOB OPERATION SHEET

UNIT: Soldering and Sheet Metal Work

JOB: Project--Forming Sheet Metal and Soldering Skills

MATERIALS NEEDED:

1. 3 pcs. sheet metal: 4" x 4-1/2".
2. Scratch awl and rule.
3. Cold chisel.
4. Metal vise.
5. Mallet or hammer.
6. Solder and flux.
7. Clean damp cloth.
8. Rivets.

What to Do	How to Do It
A. Hook joint.	1. Prepare sheet metal. a. Cut sheet metal into three pieces: 4" x 4-1/2". 2. Mark metal: Using scratch awl, draw line 3/8" from edge of two pieces of sheet metal. 3. Bend metal: a. Bend metal along line. Hold it between two pieces of angle iron in vise. Use wooden mallet. Do not beat metal until it stretches. b. After edges are bent to a 90° angle, bevel them further back to form hooked edges. 4. Apply flux: Clean and apply flux to hooked edges to be joined. Apply flux sparingly only to area you want to apply solder. 5. Join pieces: Hook edges together and close joint by striking lightly with mallet. 6. Solder: Hold face of hot soldering copper firmly along seam so that heat from soldering iron will heat metal to point where solder will flow back into hook seam. Solder should flow from tip of soldering copper into seam. If solder is dull and rough, copper is too cold. A final pass may be necessary to leave desired finished-looking seam. Wipe with damp

(Continued on next page)

Project--Forming Sheet Metal and Soldering Skills (Continued)

What to Do	How to Do It
	cloth to remove flux. Use same procedure to solder other side of lock seam.
B. Lap seam.	1. Prepare pieces. a. Draw line 3/8" along edge of two pieces of metal. b. Clean each edge and apply suitable flux. Apply carefully and sparingly. c. Place two pieces together, overlapping along seam. 2. Solder. a. "Tack" two together with a drop of solder at each end of seam. b. Move hot soldering copper along seam keeping face pressed firmly against edge of seam and feed solder into seam by touching it to tip of soldering copper. Hold two pieces together until solder cools by applying pressure to top piece of metal with piece of scrap iron. c. Wipe clean with damp cloth. d. Use same procedure to solder other side of lap joint.
C. Repair small holes.	1. Prepare metal. a. Make five small holes in left piece of sheet metal with nail. b. Clean metal around hole on both sides, using emery cloth, steel wool, etc. c. Apply suitable flux. 2. Solder. a. Apply drop of solder to hole. Hold clean, well-tinned, hot soldering copper perpendicular to hole. Push tip of copper into hole and rotate slowly. Solder should run off tip of copper and fill hole. b. Wipe off excess flux with damp rag.
D. Repair holes with rivet and solder.	1. Prepare metal. a. Punch two holes about 1/4" in diameter

(Continued on next page)

Project--Forming Sheet Metal and Soldering Skills (Continued)

What to Do	How to Do It
	in right hand piece of metal. b. Clean metal around each hole on both sides. 2. Install rivet and solder: Insert clean, short, copper or galvanized rivet in each hole and hammer down. Apply suitable flux. Flow solder over and around each rivet on both sides. Clean off excess flux with damp rag.
E. Sweat-on patch.	1. Prepare metal. a. Using cold chisel, cut hole about 3/4" square in center of middle piece of sheet metal. b. Cut patch out of sheet metal of same thickness and large enough to lap over metal around hole at least 1/2" on all sides. c. Clean patch and area around hole that patch will cover and apply flux to both patch and area around hole. 2. Solder. a. Tin area around hole that patch will cover and entire patch. b. Place patch over hole so that tinned areas touch. Press and hold patch firmly on metal with piece of scrap iron or tang of file. Use hot soldering copper to heat patch and metal under it so that solder will melt and join patch to metal below. Continue to hold patch in place until solder cools. c. Run bead of solder around edge of patch to guarantee water-tight bond. Be careful not to melt patch loose during this latter process.

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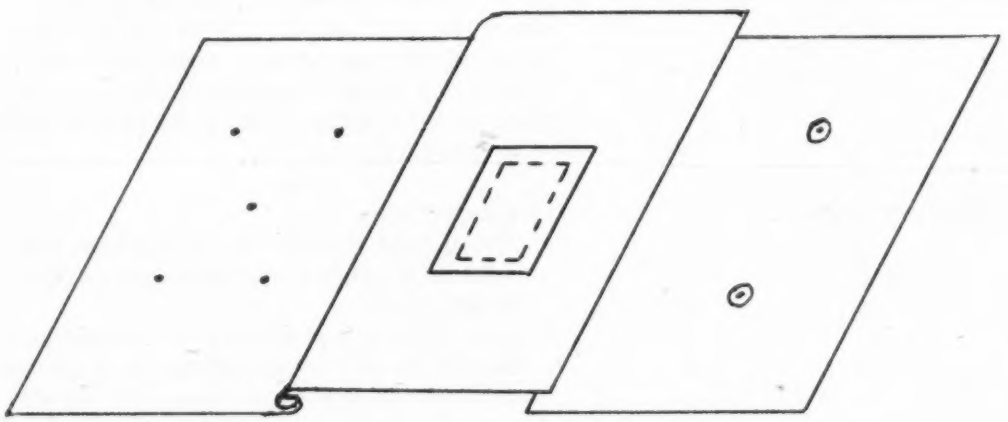
Project--Forming Sheet Metal and Soldering Skills (Continued)

COMPLETED EXERCISE SHOULD LOOK LIKE THIS:



UNIT: Farm Power and Machinery

PROBLEM AREA: Operating the Farm Tractor

OBJECTIVE: Develop ability to operate and perform daily service operations on farm tractor.

THINGS TO BE LEARNED	CLASSROOM ACTIVITIES
A. Understand function of each instrument and control on tractor.	Use operator's manual or actual tractor to point out location of various instruments and controls. Discuss function of each and proper use of each by operator. 1. Instruments. a. Oil pressure gauge. b. Temperature gauge. c. Ammeter. d. Hour meter. e. Fuel gauge. 2. Controls. a. Ignition switch. b. Engine speed control lever. c. Starter control. d. Choke control. e. Fuel shut-off valve. f. Clutch. g. Gear shift lever(s). h. Brakes. i. Hydraulic lift control lever. j. Power take-off lever.
B. How to check tractor for conditions of safety and readiness to operate.	Discuss steps careful operator must take before starting tractor each day. 1. Radiator--check water level. 2. Fan belt and generator belt--check to see if they are on and have correct tension. 3. Air cleaner--service according to type. 4. Crankcase oil level--check dip stick. 5. Fuel filter sediment bowl--service if condition indicates need. 6. Fuel level in tank--should be full.

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Operating the Farm Tractor (Continued)

THINGS TO BE LEARNED	CLASSROOM ACTIVITIES
	7. Battery--clean, filled with water, and cables tight. 8. Tires--correctly inflated.
C. How to place tractor in operation.	Demonstrate steps to follow in starting petrol engine and diesel engine. (Use Job Operation Sheet)
D. How to operate tractor in safe manner.	Discuss following and other possible rules of safe operation. Use tractor for demonstrating procedures. 1. Engage and disengage clutch smoothly. 2. Shift gears carefully to prevent clashing. 3. Select proper gear for work to be done and conditions encountered. 4. Speed should be reduced when working rough ground, around ditches, on hillsides, or when making turns. 5. Select gear which gives desired speed at full throttle. 6. Do not overload tractor for any long period of time. 7. Observe instruments during operation. 8. Latch brake pedals together when driving in high gear. 9. Do not have brakes latched together when operating in field. 10. Do not allow extra riders on tractor unless equipped with training seat. 11. Keep tractor in gear when going downhill. 12. Do not wear loose fitting clothing when working around tractor. 13. Never hook load anywhere but to drawbar or lifting arms.

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Operating the Farm Tractor (Continued)

THINGS TO BE LEARNED	CLASSROOM ACTIVITIES
E. How to stop tractor and shut off engine.	1. Reduce speed of engine by moving speed control lever. 2. Disengage clutch by pressing pedal. 3. Use brakes to bring tractor to full stop. 4. Place gear shift in neutral. 5. With engine idling, re-engage clutch. (Turning off petrol engine) 1. Allow it to operate for short time. 2. Turn off ignition. 3. If tractor is not to be used for several days, shut off petrol supply vaive on filter bowl.

JOB OPERATION SHEET

UNIT: Farm Power and Machinery

JOB: Operating the Farm Tractor

MATERIALS AND EQUIPMENT NEEDED:

1. Tractor.
2. Two-wheel trailer.
3. Three-point hitch implement.
4. Wood stakes.
5. String.

What to Do	How to Do It
A. Check tractor for readiness to operate.	Each student operator will check water, fuel, oil, air cleaner, and tires before starting tractor.
B. Start, operate, stop tractor correctly.	Each student will be allowed to start engine using correct procedures: (Petrol Operated) 1. Open fuel shut-off valve. 2. Put gear shift in neutral. 3. Set brakes. 4. Advance speed control lever about one-half. 5. Pull choke all the way out when starting cold engine. 6. Turn ignition switch on. 7. Depress clutch pedal all the way. 8. Engage starter firmly. 9. Release starter as soon as engine starts. 10. After engine is running, push choke back to normal position. 11. Check instruments immediately. 12. Regulate engine speed with control lever--avoid excess speed. 13. Warm up engine before placing it under load. (Diesel Operated) Diesel engines differ in their starting methods. Check the operator's manual for correct starting procedure. Special aids

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Operating the Farm Tractor (Continued)

What to Do	How to Do It
	for starting in cold weather include: Built-in electric heater for preheating intake manifold, starting fluid fed through intake breather cap, or use of other capsules.
	Operate tractor safely: 1. Disengage clutch and shift into second gear without clashing gear. 2. Release brakes. 3. Advance throttle to half-speed. 4. Slowly and smoothly engage clutch. 5. Drive forward only short distance and stop by disengaging clutch and using brakes to come to full stop. 6. Place gear shift in reverse, slowly engage clutch, back up to starting position, stop. 7. Disengage clutch, place gear shift in neutral, reduce speed to idle, re-engage clutch. 8. Lock brakes in "hold" position.
	Shut off engine properly. 1. Allow engine to operate for short time. 2. Turn off ignition.
C. Hook up an implement to the tractor drawbar.	1. Back up tractor to implement so that center of drawbar is adjacent to hitch point of implement (use two-wheel trailer). 2. Stop tractor, shift to neutral, set brakes, dismount. 3. Proceed to attach trailer to drawbar using clevis, pin, or ball-type hitch, whichever is appropriate.
D. Attach implement to tractor using 3-point hitch system.	Use plow or disc to attach to tractor. 1. Back up tractor squarely to implement until lift arms are even with hitch of implement.

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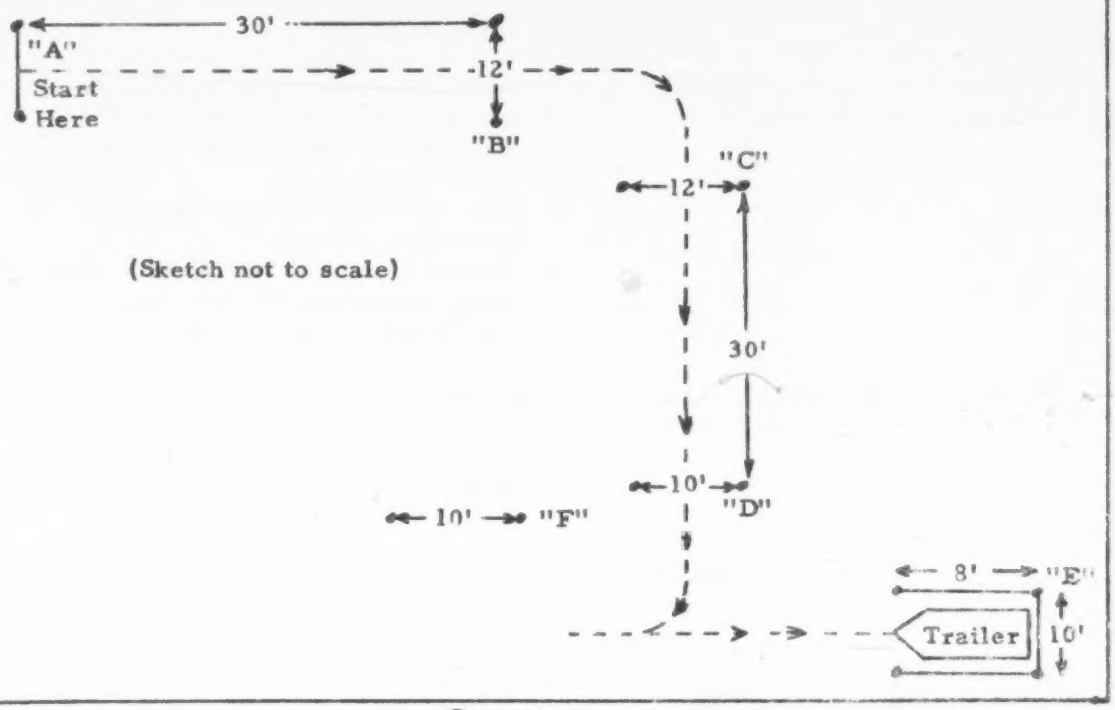
Operating the Farm Tractor (Continued)

What to Do	How to Do It
	2. Using hydraulic lift control lever, adjust height of lift arms to same height as hitch pins. 3. Shift to neutral position, set brakes, dismount. 4. Slide lift arms into hitch pins; secure. 5. Place upper control arm into position, secure. 6. Using control lever, raise and lower implement once. 7. Disconnect tractor from implement, drive forward about 10 feet, stop tractor, turn off ignition.
E. Drive tractor and trailer over specific course.	Lay out course, drive stakes and connect with string according to sketch. Each student will be required to drive tractor from starting position "A" along route to trailer, hook onto trailer, drive between the two stakes at "F", back trailer into its original spot "E". He will then unhook trailer and drive back to "A" and shut off tractor. SAFETY WILL BE OBSERVED AT ALL TIMES!



JOB OPERATION SHEET

UNIT: Farm Power and Machinery

JOB: Servicing the Small Four-Cycle Engine

MATERIALS NEEDED:

1. Screwdriver.
2. Wrenches.
3. Feeler gauge.
4. Clean oil.
5. Container for old oil.
6. Compressed air.
7. Funnel.
8. Four-cycle engine.

What to Do	How to Do It
A. Change oil after every 25 hours of operation.	1. Change while oil is warm. 2. Open drain plug at bottom of sump. 3. Engine may be drained through oil filler opening (tipping). 4. Replace drain plug. 5. Fill with clean oil to bottom of oil filler cap. 6. Replace cap.
B. Service air cleaner at least every 25 hours of operation.	(Oil foam type) 1. Remove thumb screw. 2. Lift air cleaner from carburetor. 3. Take air cleaner apart. 4. Wash element in solvent. 5. Squeeze dry and re-oil with about three tablespoons full of clean oil. 6. Squeeze to distribute oil. 7. Assemble parts and fasten to carburetor. (Oil bath type) 1. Unscrew element from carburetor. 2. Wash element in solvent and shake out excess solvent. 3. Remove oil cup and pour out dirty oil. 4. Wash cup in solvent. 5. Refill with clean oil to proper level. 6. Replace cup on carburetor.

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Servicing the Small Four-Cycle Engine (Continued)

What to Do	How to Do It
	7. Screw element back onto carburetor securely.
C. Adjust carburetor--only as needed.	1. Close needle valve clockwise, and then open 1-1/2 turns. 2. Start engine and warm up. 3. At normal operating speed with no load, turn needle valve in until engine starts to lose speed. 4. Slowly open needle valve past point where engine operates smoothest and just before point where engine begins to run unevenly. 5. Hold throttle in "idle" position and turn idle speed adjusting screw until fast idle is obtained.

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